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DISTINCTIVENESS BASED ILLUSORY CORRELATIONS OF SOCIAL STIMULI : EFFECTS ON MEMORY AND TIME.

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LIST OF ABBREVIATIONS

Attr :	Attribution
Cell A:	Majority actor, majority behaviour (maj-A, maj-B)
Cell B:	Majority actor, minority behaviour (maj- A, min- B)
Cell C:	Minority actor, majority behaviour (min- A, maj- B)
Cell D:	Minority actor, minority behaviour (min- A, min- B)
DBIC :	Distinctiveness-based illusory correlation
Er:	Error
ExS:	Experimental salience
Fa:	False alarm
Freq :	Frequency
IC:	Illusory correlation
ICs:	Illusory correlations
Imp:	Impression
Mem:	memory
Rec :	recall
Rec err:	Recall error
Recog :	Recognition
RwS:	Real-world salience
T1:	Time one
T2:	Time two
Ver:	Verbal
Vis:	Visual

RÉSUMÉ

Cette étude examine les corrélations illusoires (CI) basées sur la saillance (distinctiveness) des stimuli. Nous utilisons un paradigme similaire à celui de l'étude classique de Hamilton et Guifford (1976) afin de reproduire l'effet sauf que nous avons utilisé deux individus au lieu de deux groupes. Nous avons présenté 36 phrases ou photos décrivant un acteur ayant des comportements 'favorable' ou 'défavorable' à 292 étudiants d'un CÉGEP. Immédiatement après la présentation ainsi qu'une semaine plus tard, les étudiants ont rempli un questionnaire mesurant l'attribution de chaque comportement à l'un ou l'autre des acteurs, l'estimation de la fréquence des comportements minoritaire, le rappel libre et la reconnaissance d'un sous-groupe de stimuli et de leurres. Les résultats ont été examinés selon le médium de présentation (verbal ou visuel), le type de saillance (comportements minoritaires soit défavorables ou favorables) et la tâche d'orientation (formation d'impression ou de mémorisation). Les résultats démontrent que l'effet de CI se produit pour des individus (au lieu de groupes) et ceci dans les deux modes de présentation (verbal et visuel). Contrairement à nos attentes, l'effet de CI est plus prononcé lorsque les comportements favorables sont minoritaires. De plus, il semble que les processus de formation d'impression et de mémorisation se produisent indépendamment de l'orientation donnée par les consignes. Les résultats ne confirment pas le rôle de la saillance sur l'effet de corrélation illusoire. Il serait donc nécessaire d'envisager une/des explication(s) alternative(s) pour ce phénomène. Le facteur temps, innovateur dans ce domaine, démontre que l'effet peut apparaitre et même devenir plus fort après sept jours. Cette recherche tend à démontrer que l'effet de CI peut se généraliser aux cibles individuelles et que le phénomène repose sûr les erreurs de la mémoire, notamment les fausses alarmes et les erreurs d'attributions, au lieu que sur la saillance des stimuli minoritaires. Finalement, nous discutons des contributions ainsi que des limites de notre étude. Nous offrons également quelques pistes pour les recherches futures.

ABSTRACT

This study specifically focused on distinctiveness-based illusory correlations (ICs). By using a paradigm that varied only slightly from Hamilton and Gifford's (1976), we reproduced the illusory correlation (IC) effect with stimuli depicting two individuals instead of two groups. We presented 36 sentences or photos describing an actor who displays socially desirable or undesirable behaviour to 292 college students. Immediately, after the presentation and one week later they filled out a questionnaire which measured their correct attribution of behaviours to one or the other actor, their estimation of the frequency of minority behaviour, free recall and recognition of a sub-group of hits and foils. Results were examined by comparing IC effects in the two media of presentation (verbal vs. visual), the two types of salience (undesirable minority behaviour vs. desirable minority behaviour) and task set (impression formation vs. memorization). We found an IC effect for stimuli depicting individuals in both media. Contrary to our expectations, the IC effect was stronger when minority behaviour was favourable. It seems that the processes of impression formation and memorization occur regardless of the task condition. Overall, results do not confirm the role of salience, and it is necessary to consider other approaches to explaining this phenomenon. The time factor, which is an innovation in this area of research, revealed that the IC effect could either first appear or increase after seven days. Our data suggests that illusory correlations can be generalized to stimuli depicting individuals, not just groups of people or groups of inanimate objects. Our data also suggests that the phenomenon stem from errors of memory, particularly false alarms and misattribution, rather than from an enhanced memory for salient items. Finally, we indicate the implications and limitations of this study as well as suggestions for future research.

Key words: experiment, study, distinctiveness-based illusory correlations, effect of time, verbal medium, visual medium, real world salience, experimental salience, impression task, memory task, attribution, frequency, recall, recognition.

CHAPTER I

GENERAL INTRODUCTION

The field of illusory correlation (IC) research has been much neglected for a number of years. In fact, little if anything about the subject has been published in the last ten years. However, the reduced interest in the phenomenon is not the result of having resolved all issues concerning the cause of the phenomenon or the result of a lack of generality in the previous findings. Despite its neglect, empirical research has shown that the IC effect is a robust phenomenon (Mullen & Johnson, 1990; meta-analysis by McGarty, C., Haslam, S. A., Turner, J. C., et al, 1993).

The term "illusory correlation" was first coined by Chapman in 1967 who defined it as an erroneous association between two variables. More specifically, an IC is a cognitive error or bias that occurs when one perceives an association either that is not there or that is considerably weaker than one believes it to be. The literature describes two types of illusory correlations (ICs); those based upon expectations derived from pre-existing knowledge about a stimulus (e.g. stereotypes) or those derived from the distinctiveness or salience of the stimulus itself (e.g. a loud person in a library full of quiet people). The present thesis will focus on distinctiveness based illusory correlations.

The most common paradigm for studying the phenomenon was developed by Hamilton and Gifford (1976). It requires participants to judge two groups of persons based on presented information about the socially desirable and undesirable behaviour among selected members of each group. One group is represented by twice as many stimuli as the other group, and one type of behaviour is represented twice as much as the other type (as depicted in table 1.1 below).

Table 1.1

Distribution of sentences per cell in the Hamilton & Gifford (1976) experiment

	Pos. sentences	Neg. Sentences
	Cell A	Cell B
Group A	18 stimuli	8 stimuli
	Cell C	Cell D
Group B	9 stimuli	4 stimuli

Until the present, the vast majority of research on ICs has aimed at explaining biased judgments or stereotypes concerning groups of people. Very little research has been done with this paradigm to study individuals. The few studies that have tested ICs with individuals have shown inconsistent results, which among other things, may be attributable to serious divergence from the original paradigm. This study is concerned with the IC effect that occurs with stimuli that depict or describe individuals instead of groups. To study the phenomenon, we employed a paradigm that has been used more recently by various researchers and, which is nearly identical to the one originally employed by Hamilton and Gifford (1976).

A pertinent issue that concerns the perception and judgment of individuals pertains to misattribution effects. That is, to what extent participants mistakenly assign responsibility for behaviours or actions to a given individual. We wanted to distinguish to what extent such mistakes are, in fact, the result of the bias inherent to ICs, i.e. that such errors are due to an erroneous association between a category of behaviour and a specific individual. In addition, we must note that prior research has presented conflicting results on the implication of memory in this phenomenon. We feel it important to determine in what way the bias and errors inherent to the IC phenomenon are associated with memory effects. More specifically we would like to see to what extent such effects are due to distinctiveness and salience or due to errors in recall and false alarms in recognition.

The developers of the classic paradigm for studying this phenomenon had also devised a second experiment (Hamilton and Gifford, 1976, experiment 2) where the valence of the stimuli was reversed (positive behaviour was in the minority for both groups of persons). They still found an IC effect. To our knowledge, this variant was never replicated. Therefore, at least a second study reversing the valence is much needed to see if the findings can be replicated.

So far, all research that has been done on ICs has focused on its immediate effects. We would like to establish if the IC bias has more long-term effects and determine if it contributes to the formation and to the maintenance of false memories over time. This could lead to important consequences in the misperception of other individuals' behaviour. The inclusion of a delay before re-testing, i.e. including a time factor, would be a needed addition to the research on this phenomenon. As we can see, there are still quite a few issues left to be resolved in the field of illusory correlations.

There are six main objectives to this study. 1) To determine if the IC effect is possible with stimuli depicting two separate individuals instead of two separate groups of people or two separate groups of objects. 2) To determine the role of memory with regard to IC effects. 3) To determine if time affects illusory correlations. A time measure is frequent in memory research but inexistent in traditional IC research. 4) To determine if the medium of presentation affects the IC phenomenon. We will use visual stimuli (images of actors performing various behaviours) as well as the traditional verbal stimuli (sentences describing actors performing various behaviours) to see if the IC effect extends to both media when using individual targets. 5) To determine if individual targets instead of group targets produce an IC effect when using reversed salience, (i.e. with positive behaviour as the rare category) as was found by Hamilton and Gifford (1976, exp. 2). 6) Finally, we wish to determine if task set has an influence on the IC effect. As such, we will be measuring if differences exist between an impression formation task and a memory task. These objectives will contribute to our better understanding of the phenomenon and allow us to increase our knowledge as to its seemingly ubiquitous nature. Our experiment will revolve around a 2 (media) x 2 (salience) x 2 (task) repeated (time) measures design.

THEORETICAL CONTEXT

The notion of distinctiveness based ICs refers to the characteristics of certain stimuli, which render them distinct or prominent (i.e. salient) in a given context. Distinctiveness or salience derives from any aspect of a stimulus that for any reason makes it stand out (Reber, 1995). A stimulus can become distinctive by any number of ways. It could be novel, infrequent, figuratively attractive, unusual, goal-relevant, or it could simply dominate the visual (or auditory) field. A person could be asked to pay attention to a certain stimulus and that alone makes it distinctive. In this way, distinctiveness elicits attention, increases the perceived prominence of a stimulus in various judgments, and influences most evaluations of causality (Fiske & Taylor, 1991). Regardless of the way it is created, it has been shown to have robust and wide-ranging effects (McArthur, 1981). We will add refinement to this cognitive phenomenon as we proceed. First, let us indulge in the research that branded the term.

The first study that identified ICs was conducted by Chapman (1967) and although subsequent authors did research on either expectancy or distinctiveness-based ICs, Chapman identified both. In this study, he presented participants with equally occurring word pairs such as: *lion-tiger, bacon-eggs and blossoms-notebook.* When asked to give details on what had been presented, participants reported that some word pairs had appeared more often than others. The word pairs reported to have appeared more often were either longer in length like *blossoms-notebook*, which he categorized as distinctive, or associated in usage like *bacon-eggs* or *lion-tiger, which* he categorized as expectancy-based. From this experiment, he suggested that infrequently occurring stimuli or distinctive stimuli were particularly noticeable or striking to participants.

Chapman's work inspired Hamilton and Gifford's (1976) seminal research on ICs. This research sought to determine whether participants would associate less frequently presented behaviour descriptions with a less frequently presented group. They hypothesized that stereotypic judgments could develop from purely cognitive information-processing mechanisms. The paradigm they devised consisted of sequentially presenting participants with 39 sentences varying from moderately positive, e.g. "John, a member of group A, visited a sick friend in the hospital," to mildly negative, e.g. Steven, a member of group B, made a sarcastic remark towards another person. The 39 sentences were divided into four groups or cells representing a two by two (2X2) cross-classification. Both groups and behaviours were presented in a 2:1 ratio. As a result, group "A" members were described by 18 positive and 8 negative sentences, while, group "B" members were described by 9 positive and 4 negative sentences as previously presented in table 1.1. For this experiment, participants were told that behaviours and group sizes were drawn from population samples and that in effect group B was smaller than group A. Each of the 39 statements was presented one at a time for a period of eight seconds. Once all 39 sentences were presented, participants had to complete three different tasks or dependent measures, as described below.

Trait ratings comprised the first dependent measure that Hamilton and Gifford (1976) asked participants to complete. In this task, participants were asked to rate members of two separate groups on a series of 20 attributes. The selected attributes were categorized as either social/interpersonal (e.g. popular, sociable vs. irritable, unhappy) or intellectual/task-related (e.g. industrious, intelligent vs. lazy, foolish). The authors hypothesized that if "paired distinctiveness" was the basis for stereotypic judgments, then participants would rate group B as less desirable since the occurrence of negative sentences (i.e. cell D) for this group occurred only four times thus making them distinctive. Trait rating results indicated that participants rated group B with more undesirable attributes than they did for group A.

The second dependent measure was an *attribution to group membership*. In this task, participants were required to read 39 sentences in the form "John, member of group ____, visited a sick friend in the hospital." Participants had to indicate group membership (either A or B) in the space provided. For this measure, the authors hypothesized that if the co-occurrence of distinctive events results in an overestimation of their frequency, there would be a tendency to overestimate negative behaviours for group B. This is exactly what they found. Specifically, although only one-third of the undesirable statements described members of group B (4/12), over half of them were attributed to that group. The authors therefore stipulated that participants falsely attributed undesirable behaviours to the smaller group.

The third measure consisted of asking participants the *frequency* at which the statements appeared. For this, participants were given the total number of statements describing each group and subsequently asked to estimate how many undesirable statements were presented for each of these two groups. The authors hypothesized that if participants overestimated the frequency of co-occurrence of the distinctive events, they would overestimate the number of undesirable behaviours in the B group, which is exactly what they observed. Hence, with the presentation of groups and behaviours in a 2:1 ratio, the authors found a distinctiveness-based IC effect for trait ratings, attribution to group and frequency estimation measures.

In a second experiment (Hamilton and Gifford, 1976, experiment 2), the authors reversed the valence of the two categories of behaviour. Whereas the minority behaviour had been negative in the first experiment, it was now positive, and vice versa for the majority behaviour. Consequently, the least frequent behaviour for both groups was now comprised respectively of nine positive statements for cell B and four for cell D. The authors obtained the same type of results as in the previous experiment, which led them to conclude that distinctiveness was a stable phenomenon regardless of the type of behaviour being used (either negative or positive). With these findings, Hamilton and Gifford

(1976, exp. 2) concluded that the IC effect could be based solely on the cognitive mechanisms involved in processing information about events that differ in their frequencies of co-occurrence. To our knowledge, the valence reversal of behaviour has never been replicated for this type of experiment. We will therefore attempt to replicate their findings. Note that we consider negative behaviour in cell D as more representative of what would occur in a real-world situation. Negative behaviour is made more salient by its rarity. We will therefore refer to this as the real-world salience (RwS) condition. Conversely, when there is positive behaviour in cell D (as in Hamilton and Gifford, 1976, experiment 2) we will refer to it as the experimental salience (ExS) condition.

Adding to the reliability of the observed IC phenomenon, Hamilton, Dugan and Trollier (1985) replicated Hamilton and Gifford's (1976) procedure. The difference in this experiment was that participants were shown a 2x2 summary table (similar to table 1.1) before being asked to complete the dependent measures. The summary table specified the frequencies of positive and negative statements about the two groups, but even with this added information, participants still rated the smaller group as more negative than the larger group, there again showing a distinctiveness-based IC effect. From this finding, the authors concluded that once the IC effect is formed, it might be very difficult to modify cognitively and therefore suggested that the IC phenomenon creates a cognitive bias in the perception of groups.

The experiments described above confirm that ICs can be obtained by using a 2:1 ratio for groups. The studies show that participants will make biased judgments about traits, biased attributions to group membership as well as biased frequency estimates about the smaller group (minority group) and that these biases are due to the relatively small number of behaviour descriptions in cell D (minority category and minority group). One study conducted by Risen, Gilovich and Dunning (2007), shows that an IC effect can be produced by showing a single instance of unusual behaviour. They conducted a series of four studies in which participants were presented with 16 sentences that described individual members of either a *rare* or *common* group performing a *rare* or *common* behaviour. Study one showed that a single inconsistent behaviour on the part of a minority group member tended to elicit greater cognitive processing. Study 2 demonstrated that participants were devoted to trying to understand if there was a connection between the group and the inconsistent behaviour performed by one of its members. Study 3 showed that participants under this attributional activity tended to form a unit between group and anomalous behaviour and that the combination of actor and action makes the action particularly memorable. Study 4 demonstrated that people do indeed develop ICs between anomalous behaviours and minority groups when they are confronted by such jointly distinctive information in a real-life "one-shot" context. Specifically, they found evidence that group-behaviour association would generalize to other members of the minority group and influence subsequent interactions with members of that group.

With these results, the authors reiterate the validity of ICs as presented by Hamilton and Gifford (1976), since the same process in the perception of rare group/behaviour seems to be occurring. However, their study differs from Hamilton and Gifford since they were able to show that a single action can be coded as unusual, thereby prompting participants to make sense of what they saw, thus exerting a disproportionate weight on the judgment of unusual behaviour. Following this line of reasoning, an unusual behaviour performed by a minority group member not only exerts disproportionate judgment weight, thus better memory, but also an increased attributional process in which group membership can be considered as a plausible explanation for the behaviour. Hence, it would seem that an odd behaviour performed by a minority group member would affect judgment for the whole group, whereas an odd behaviour from a majority group member would affect judgment only for that group member. What Risen, Gilovich and Dunning (2007) demonstrated is that one distinctive behaviour description is sufficient to alter participant's judgment for the minority group.

A study conducted by Pouliot and Cowen in 2000, attempted to eliminate possible stereotypes associated with the stimuli. While using the classic IC paradigm, this study was novel in its approach in that the authors presented groups of edibles and non-edibles instead of groups of individuals. These two groups of stimuli had been previously judged not to have any distinct, consistent or universal favorability connotations thereby eliminating any possibility of stereotypical judgment or expectancies toward the two groups of stimuli. On a TV monitor, participants were presented with a series of 39 items divided into a majority group (group Z) comprised of 18 non-edible items (e.g. hammer, toothbrush, pencil, etc.) and eight edible items (e.g. apple, cucumber, pizza slice), and a minority group (Group Y) which consisted of 8 non-edible and 4 edible items. Thus, the edible items for group Y represented cell D, the most salient cell (combining the two minority categories; Group Y and edibles). Their goal was to measure the IC effect using the two traditional tasks and to add a third test to measure recognition memory. In the recognition task, participants were sequentially presented 32 stimuli; 16 of which were taken from the original presentation and 16 of which were foils (i.e. similar stimuli but never presented). As each stimulus was presented participants had to indicate in their booklets if the item had (or not) been presented. As in the classic research using this paradigm, the second measure was an attribution to group task, requiring participants to attribute each of the original 39 stimuli to either group Y or Z and in the third task participants were told the total number of stimuli for each group and were asked to estimate the frequency of the less frequent type of stimulus (i.e. edibles) in both groups.

The authors also wanted to determine if different levels of cognitive load affected the phenomenon since various studies had previously demonstrated that greater cognitive load increases reliance on stereotypes via the availability heuristic (defined in the next section). Cognitive load was manipulated by presenting stimuli for a duration of either four or eight seconds. There was no difference in IC effects for the two conditions. In addition, Pouliot and Cowen (2000) were innovative in also attempting to determine if the vividness of the items presented would have an effect on the IC phenomenon. In the low vividness condition stimuli were presented as sentences such as “The apple belongs to Group Y” , whereas the high vividness stimuli were presented as projected slides showing, for example, a photo of an apple with the letter indicating group membership (Y or Z) in the lower-right corner of the picture. Using photographs to depict the stimuli had never been done before in IC research.

Results for the *attribution task* showed no significant effects for cognitive load or vividness. Otherwise, participants attributed more edible items to the smaller group (Y) thus allowing them to conclude that there was an IC effect. Results for the *frequency estimation* task showed no effect due to cognitive load or vividness. However, once again, participants reported a significantly higher frequency estimate for the minority group (Y), demonstrating an IC effect with this measure.

Results for the *recognition task* indicated that cognitive load had no effect. Vividness, on the other hand, showed a significant effect. Participants in the high vividness condition, i.e. those who saw photographs, had a significantly higher level of recognizing hits and also showed fewer false alarms than participants in the low vividness category, i.e. those who read sentences. The authors argued that if ICs come from a biased judgment, then memory should reflect that bias by first, showing a better hit rate for the minority group, thus indicating that salient items have an advantage in retrieval and that second, there should be a higher false alarm rate for those same stimuli. Their data showed neither and therefore suggested that the IC phenomenon was not memory based.

This study successfully demonstrated that ICs could occur with ordinary stimuli that do not have any distinctive connotations with regard to social desirability that would distinguish the two categories or the two groups with which they were associated. What is more surprising is that recognition for non-salient items was proportionally greater than for salient items thereby demoting saliency as a required element for so-called distinctiveness-based ICs. However, this finding may be due to the nature of the stimulus material itself and/or may be due to using only recognition as a memory measure.

Just as Pouliot and Cowen (2000) found cognitive load had no effect, Fiedler, Russer and Gramm (1993) also found that this variable was not an issue for ICs.

On the other hand, their findings suggest that information processing was superior for the more frequent category of positive behaviour descriptions than for negative behaviour descriptions. More specifically, participants in the frequency estimation task and in the impressions rating tasks were more accurate, internally consistent and reliable for the majority behaviour descriptions in the majority group (cell A) than for the minority behaviour descriptions in the minority group (cell D). They suggest that memory is better for positive behaviour descriptions of the larger group than for negative behaviour descriptions for the smaller group. This echoes Pouliot and Cowen's (2000) findings using their recognition measure. With respect to the IC phenomenon, Fiedler, Russer and Gramm (1993), propose that cell D contributes little to the degree of illusion. Rather, they state that it is the reduced memory for rare events that contribute to the phenomenon. In other words, participants notice that A is positive and also have reduced memory for cell D stimuli while knowing that there are some negative behaviours. As a result of this combination, they assign negative behaviours to the group they have less experience with, i.e. the minority group.

In an attempt to elucidate further what Fiedler, Russer and Gramm (1993) did, Fiedler (2000) presents a mathematical model for illusory correlations. He states that the Gestalt principle of congruency accounts for expectancy based IC whereas the Gestalt principle of distinctiveness is relevant to illusions resulting from the asymmetry of positive vs. negative attributes and from infrequency. He also states that ICs can be explained using a connectionist framework of correlation assessment. This connectionist framework, which he calls the BIAS model, is based on the Brunswickian premise that most meaningful correlation tasks involving person perception refer to distal entities (e.g. leadership, health, danger, femininity)" (Fiedler, 2000, p.37). According to his model, the distal variables are inferred from the perceived stimulus. He mentions that singular cues alone would have a very modest effect on diagnostics and that one requires many cues to warrant a valid perception. His model presents quantitative judgment scales for every concrete proximal attribute (e.g. young-looking, politeness, rapid speech, formal dressing, strong voice, upright posture, warm expression, etc.). The model predicts correct perceptions by correlating any given distal attribute (e.g. leadership) with the aforementioned quantitative judgment scales.

Besides accounting for expectancy based ICs (not discussed here), the BIAS model also accounts for distinctiveness based ICs in three ways. First, through asymmetry (i.e. the tendency to assign different weights to information in different cells), second, through the aggregation effect (i.e. when the bias in favor of cell D is removed, the effect is due to aggregation from different sample sizes without any processing bias.), and third, through infrequency (i.e. when the distribution is skewed A=20, B=10, C=10, D=5). By finding IC effects with this mathematical model, Fiedler proposes that memory may not be a necessary factor for the phenomenon to occur. Nonetheless, he adds that memory can have a role in the phenomenon. He explains that where infrequency is concerned, participants may not necessarily have increased memory for cell D items, but rather, that less information is forgotten since there was less information presented initially (i.e. reduced noise). As such, this study proposes a different explanation for cell D stimuli than in the above study by Fiedler, Russer and Graham (1993).

The Bias model is an attempt to operationalize the different types of ICs into a common algorithm where interpretation is excluded. Through a computer program, it replicates ICs due to expectancy, distinctiveness and salience with "very few assumptions" (Fiedler, 2000, p.51), and it attempts to integrate various fields of research that deal with the phenomena (see Fiedler, Freytag and Meiser, 2009). It is interesting to note that Fiedler's BIAS model, which excludes interpretation, fuels the idea that ICs may simply be a cognitive effect that occurs because of the irregularity of stimulus presentation and not because of valence of that stimulus. In essence, since information is treated through a mathematical algorithm, it takes away any notion that judgments based on social connotations are involved in the process. Fiedler thus corroborates the earlier study by Hamilton and Gifford (1976, experiment 2) where an IC effect was found regardless of the valence (either positive or negative) of the stimuli presented in the minority behaviour category (i.e. cells B & D). Likewise, it corroborates findings by Pouliot and Cowen (2000) that found IC effects for stimuli of edibles and non-edibles that do not have any particular connotations with regard to social desirability.

Illusory correlation phenomenon with individuals

Up to now, the research presented concerned the IC phenomenon for groups. Very little research has been done with ICs and individuals. However, if the phenomenon is as robust and strong as research has suggested, we could surmise that it would also occur when judging individuals. One of the few studies that looked at ICs while using individual persons as targets was conducted by Sanbonmatsu, Sherman and Hamilton (1987). They compared individual and group targets using a procedure which differed from the one used by Hamilton & Gifford. Participants in both conditions were presented with 50 sentences. In the group condition, each sentence described the behaviour of an individual and his group membership (e.g. "Bill, member of group C, was late to work"). A different name appeared for each sentence. There were five groups (A-E) and10 sentences per group. In the individual condition, only five names were used, each name appearing in ten sentences. In both conditions, the ratio of the majority to the minority sentences was seven to three (7:3) where half the participants received seven sentences describing a socially desirable behaviour and three sentences describing a socially undesirable behaviour. The other half received the inverse ratio of desirable to undesirable sentences. In an effort to create distinctiveness, the authors asked participants to focus respectively on either one of the five groups or one of the five individuals.

Results show that participants formed ICs with the group targets but not with the individual targets. The authors concluded that an IC effect was based on the perceived association between the distinctive group and the minority behaviour. As for the individual targets, the authors noted that distinctive individuals were perceived as being more associated with the majority behaviour than were the other four non-distinctive individuals. These results also shadow what Pouliot and Cowen (2000) found in their recognition measure.

The differing results obtained between the group targets and the individual targets led Sanbonmatsu, Sherman and Hamilton (1987) to propose that different cognitive processes were involved when forming impressions of groups or individuals. They proposed that impressions of groups were "memory based" whereas impressions of individuals were made "on-line". According to the authors, memory based impressions occur when the perceiver fails to form an evaluation during the initial processing of the information. In this case, the perceiver would rely on the available information at the time of recall in order to make his evaluation. These authors proposed that the distinctiveness of the stimuli was determined by making a group salient (asking participants to focus on one in particular) combined with the infrequent behaviour descriptions for that group. They posited that ICs were due to distinctive stimuli being encoded more strongly thereby facilitating later accessibility in memory and as such, facilitating recall.

By contrast, the inconsistent results reported for the individual condition of the experiment, led the authors to propose that participants formed "on-line" impressions. In essence, they posited that participants formed impressions as each stimulus was encoded. As it is, when each behavioural description is received, the perceiver attempts to integrate it into a coherent impression. It is this impression that later serves as the basis of judgment. Consequently, the later judgment about the person is said to be more representative of all events encountered instead of just the salient ones (see Hastie & Park 1986). In fact, the authors propose that amidst all the information that is received (i.e. the 10 sentences concerning the target individual), it is likely that inconsistent or infrequent behaviour descriptions would be discounted. In addition, ambiguous information would likely be interpreted in the direction of the initial impression. Thus, a biased assimilation, reinterpretation, and discounting of infrequent types of behaviour by the salient target would be likely to occur. Likewise, a greater polarization of the salient target towards the majority behaviour would be the outcome (Sanbonmatsu, Sherman and Hamilton, 1987).

The authors note that in the individual condition of their experiment, asking participants to focus on one target (10 sentences) thus making it salient may have considerably reduced the cognitive load required to complete the task (but as mentioned earlier, other authors found cognitive load had no effect on ICs). The authors report that results for the remaining four targets were at chance level, which could indicate that participants may not even have focused on them at all. In other words, asking participants to focus on one individual (10 sentences) may have had them consider the other four individuals (40 sentences) as noise. Furthermore, directed attention to one particular target may affect the way in which information is encoded and therefore affect the nature of the associations and evaluations that result. These may have also been a contributing factor in not finding an IC effect. Thus, as Sanbonmatsu, Sherman & Hamilton (1987) suggested, it may not be the target itself but the nature of the instructions and the task that may have stopped the IC effect from occurring. To our knowledge, this study is the only one that attempted to measure the IC effect for individuals and because of its discrepant findings, it leaves many questions unanswered concerning the generalization of the effect and the processes underlying the effect with different stimuli.

Asking participants to focus on one group or person was not done in the Hamilton and Gifford (1976) study. In their paradigm, distinctiveness was derived from the overall proportion of information about the target. In addition, the information about groups was received in a random manner, making it difficult to consider the other stimuli about the other targets as "noise." It is therefore important to return to Hamilton and Gifford's paradigm in order to study the similarities and differences between processing information about group targets and individual targets. Hamilton and Gifford (1976) did however, create a distinction between groups when they informed participants about their different sizes; this could have prompted them to judge the groups differently. When people witness a behaviour outside the lab, they are not told anything about what they are supposed to look at or if the behaviour is from a small or large group. For these reasons, we feel it is important to present our stimuli with the least amount of additional information, which could create potential judgment biases in our participants.

By alerting participants beforehand about the different group sizes, Hamilton and Gifford (1976) may have biased their participants' perception and in this case may have caused the IC effect to occur for reasons other than salience. Telling participants about group size may have created a situation where participants used an anchoring heuristic, (i.e. a cognitive process where decisions are based on an initial anchor; similar to priming) to interpret what was being presented. Consider the following example; in a mock trial when a judge instructed jurors to consider the harshest verdict first, they rendered significantly harsher verdicts than participants who were instructed to consider lenient verdicts first (Greenberg, Williams & O'Brien, 1986; in Fiske and Taylor 1991). Similarly, telling participants that one group is smaller than another, in contrast to telling them one group is larger than the other, or making an individual salient by telling participants to focus on him, may also influence the judgment outcome. For the IC effect to be applicable in various circumstances, including outside of the lab, one must refrain from the type of instructions that tend to guide or create a bias toward encoding of stimuli. Therefore, research is needed, which eliminates these potential biases and permits a clearer evaluation of the extent to which the IC effect generalizes to individuals.

Most of the studies described above tried to replicate, in one form or another, the original Hamilton and Gifford (1976) study. They demonstrate that distinctiveness-based IC effects can occur when participants are presented with stimuli regarding two groups, where experimental manipulation made one group proportionally smaller than the other. However, most of these studies have employed sentences that described individuals who were either part of the majority group or part of the minority group. In contrast, one study demonstrated that the effect could occur with inanimate (non-stereotyped) objects like edibles and non-edibles, suggesting that ICs can be produced with a wider range of stimuli. In addition, this study established that the effect could be produced with stimuli in the form of images as well as with stimuli in the form of more conventional descriptive sentences.

Ultimately, the majority of studies above that used groups as stimuli found IC effects. Research done with stimuli of individuals instead of groups did not have much success in reproducing the effect (e.g. Sanbonmatsu, Sherman &Hamilton, 1987). The explanation put forth was that different cognitive processes were involved when participants encoded information about groups or about individuals. That may be a valid argument, but no other study corroborates these findings. Hence, more exploration is needed to substantiate that claim. Then again, their study derogated substantially from the original Hamilton and Gifford (1976) paradigm, which leads to question whether it was really the individuals (vs. Groups) or the methodology that produced the contradictory results.

As we have seen, the literature is sparse on ICs for individuals and prior research concerned with this matter (Sanbonmatsu, Sherman and Hamilton, 1987) has not been faithful to the original Hamilton and Gifford (1976) paradigm. The proposition put forth by Sanbonmatsu and his colleagues that two cognitive processes were involved in the treatment of information offers a plausible explanation as to why ICs were not found in the individual condition. Let us now explore the differences and similarities between on-line and memory-based cognitive processing.

Cognitive processing: on-line vs. memory-based

As presented by Fiske and Taylor (1991), using prior information to make a judgment involves the use of schemas or top-down processing. This kind of cognitive process is strongly influenced by prior knowledge (i.e. it is conceptually, or theory driven). When using schemas, the perceiver gets the general idea of what is presented rather than creating a replica in memory of all the detailed information presented. In this respect, memory-based or top-down processing leads to judgments of the stimulus that are more holistic and less precise. This can lead to a cognitive bias that is similar to an expectancy-based IC to the extent that one relies on schemas rather than the precise information when making a judgment. In this sense, expectancy based IC would be more likely as a result of this type of processing.

According to Sanbonmatsu, Sherman and Hamilton (1987), on-line processing occur when the perceiver forms an impression as the stimulus is encoded. This is like bottom-up or data-driven processing because information is used to make a judgment as it is being perceived (Abelson, 1981b; Bobrow & Norman, 1975; Rumelhart & Ortonym, 1977, in Fiske & Taylor, 1991).

Although it is possible to define and examine both expectancy and distinctiveness ICs independently, it would be difficult to make them completely independent from each other, just as it is impossible to totally separate top-down and bottom-up processing because they are not mutually exclusive. All processing involves the association of incoming stimuli with pre-existing schemas in memory while at the same time being guided by the concrete characteristics of the data as it is received. In the same way, the process underlying distinctiveness based IC effects may not be totally devoid of expectations and the process underlying expectancy based IC effects may not be devoid of perceived distinctiveness. A given stimulus may be novel or distinctive as it is initially perceived but it becomes referenced to prior information or pre-existing schemas as it is encoded. This could attenuate the distinctive nature of the stimulus. Therefore, although a distinctive stimulus may be perceived as such, the judgment based on that stimulus may use other information from memory with which that stimulus was associated and no longer be based on the initial distinctive quality.

Sanbonmatsu, Sherman and Hamilton (1987) proposed that *memory-based* cognitive processes were involved when it came to processing group information, i.e. participants did not form an impression of the various groups at the time the information was initially perceived but rather at the time the information was retrieved in order to make a judgment or to respond in some way. However, the research reviewed so far using the classic paradigm and groups as targets indicate that distinctiveness based IC occurs when an on-line cognitive processing strategy is used. The difference between these accounts and that proposed by Sanobmatsu, Sherman & Hamilton (1987) may be due to the changed paradigm, methodology and task in the latter study.

Other research has attempted to determine whether different instructional sets given to participants would have an effect on the way information is encoded and consequently affect subsequent impression. At the same time, it was important to determine whether information about individual targets and group targets were processed in the same way. McConnell, Sherman & Hamilton (1994) used three different instruction sets (impression, memory & comprehension) to determine if participants used an on-line or a memory based strategy to encode information about individuals or groups. The authors closely followed the Hamilton and Gifford (1976) paradigm, but instead of presenting a set of 39 stimuli, they presented 36. As such, they could truly obtain a 2:1 ratio within and between the two groups as well as within and between the two behaviours. As a result, cell A, B, C and D contained respectively 16, 8, 8 and 4 stimuli. Prior to the presentation of 36 stimulus sentences, participants were instructed to either 1) form a coherent *impression* of what each group (person) would be like or, 2) concentrate hard on committing each statement to *memory* or, 3) try to assess whether or not a fourth-grade child would have difficulty in the *comprehension* of each sentence.

In the "individual" condition, participants read sentences depicting a person's name and behaviour with no mention of group affiliation. The results showed that participants demonstrated more elaborate or on-line processing under the impression and memory instructional sets and less under the comprehension instructional set. Results were not as straightforward in the group condition where group affiliation had been added to the sentences. The authors had hypothesized that memory-based processing would be observed for group targets (as was proposed by Sanobmatsu, Sherman & Hamilton, 1987) with the memory and comprehension instructional sets, while the impression set would call for on-line processing. However, they found that participants still used on-line processing even in the memory instructional set, thus showing that on-line processing still occurs with group targets.

Besides contributing to the distinction between on-line and memory-based judgments of social targets, the results of this experiment also contribute to the IC research by showing that the effect was found for groups and for individuals in the comprehension set condition and that these appear to be memory-based. However, in the memory and the impression set for group targets, the IC found revealed that participants formed on-line impressions, which are contrary to what was expected. The authors suggest that without explicit directive instructions (as in the memory set instructions) behavioral information about group members leads to some spontaneous trait extractions or on-line processing. Consequently, this study demonstrates that IC effects can be obtained for groups and for individuals using both cognitive processing strategies (on-line and memory-based) and the results do not support the explanation proposed by Sanbonmatsu, Sherman and Hamilton (1987). In effect, the authors suggest that the two cognitive strategies should be considered as part of a continuum rather than as dichotomous.

We would tend to concur with this analysis and suggest that even with explicit instructions these two cognitive processes cannot be mutually exclusive. However, the task is to determine if one has precedence over the other in specific conditions (e.g. impression or memory task). Since impressions tend to stem from global evaluative judgments at the time of encoding (Fiske and Taylor, 1991), we could surmise that stimuli about individuals will be processed on-line and that participants will try to integrate the information from various behaviours into a single coherent impression. As was shown by McConnell, Sherman & Hamilton (1994), on-line cognitive processing would lead to better recall and recognition scores and a greater IC effect. On the other hand, memory-based cognitive processing should lead to better recall and recognition for the majority group, thereby reducing or eliminating the IC effect. Our study will attempt to back up these findings and attempt to determine if the same findings occur when stimuli are presented by visual media and whether they persist, increase or decrease over time.

In addition to measuring ICs for different instructional sets, McConnell, Sherman and Hamilton (1994) also wanted to determine if the phenomenon would be altered by primacy or recency at the time of presentation. Furthermore, they wanted to determine whether a "post-encoding" condition would produce the same kind of bias in the perception of groups. Through a series of experiments, they investigated the effect of presentation order of the salient stimulus. They managed to produce the IC phenomenon in three conditions: where a salient stimulus was presented at 1) the beginning (primacy loaded), 2) end (recency loaded) or 3) when equally distributed (neutral). No significant differences were found in the strength of the ICs between the three conditions, suggesting that presentation order has no influence.

Since no differences were observed in the strength of the illusory correlation effect between the three conditions, the authors stated that although a stimulus may not be distinctive at the time of presentation, it could become distinctive as new information about groups is being processed. In other words, they stipulated that a post-encoding (similar to on-line) process occurred whereby information is not simply read and stored becoming static in memory, rather, it is processed in a continuous manner such that subsequent information may trigger prior information to be reconsidered, reviewed and re-assimilated in a different way. Hence, the authors proposed that ICs could be formed as new information was processed. We could add that post-encoding is similar to the concept of differential processing (Hunt, & Worthen, 2006), in that information being processed on-line, remains so fresh that it is 'revisited', as new information is being perceived. This 'revisited' information, combined with novel information forms the basis of judgment. Memory-based information is therefore not solicited or necessary for a judgment to occur.

The notion of post-encoding undermines current thought that ICs depend on memory for certain information. A number of researchers do not support a post-encoding theory (see: McCloskey & Zaragoza, 1985; Bransford & Johnson, 1972; Zadney & Gerard, 1974; Hamilton and Gifford (1976, Experiment 2), and Srull &

Wyer, 1980). They have shown evidence that prior information stored in memory is strongly implanted and is not easily dislodged by subsequent stimuli. However, it is not clear that this would exclude the possibility that although in certain conditions perceivers may rely on their memory for the initial stimulus, they also revise their impression and are capable of making a global judgment that is not based on recall of specific data. Srull & Wyer (1980) proposed such a dual process to explain anomalies in impression formation where different judgments about the same target would occur depending upon whether or not perceivers actively tried to recall specific information about the target. In general, there are still diverging views of how and why the IC phenomenon occurs.

A parallel concern has been to determine whether ICs occur at the time that a stimulus is encoded or at the time that it is retrieved. This is an important issue because if ICs occur when information is encoded, it could mean that a bias is present as information is initially processed, thus creating a potential for false memories and eliminating the possibility of ever recovering a trace of the original information. On the other hand, if ICs occur at retrieval it would imply that the stimulus information is initially processed and encoded correctly and therefore ultimately retrievable, but that a bias occurs for other reasons. Research done by Fiedler, Hemmeter and Hofmann (1984), and Hamilton, Dugan and Trolier (1985, Experiment 1, 2), have demonstrated that ICs can indeed occur while information is being encoded.

The view that distinctiveness based ICs are present at encoding has been accepted for over 30 years (see Hamilton and Rose, 1980). The premise concerning distinctiveness-based ICs for group targets is that infrequent or otherwise salient items benefit from more extensive encoding at the time of presentation, (Hastie and Park, 1986). These authors also propose that memory-based judgments are rare because "when a new judgment must be made in the absence of perceptually available evidence, subjects rely on previous judgments rather than remembered evidence." (Hastie and Park, 1986, p.263), as they would need for a true memory-based judgment. Once again, we lack information about individual targets on this matter, although we suspect that the same holds true, as suggested by Srull & Wyer (1980) in their dual processing model mentioned above.

To this point, we have looked at ICs from different angles. We have seen that the effect can occur with both groups and individuals. We know that different instruction sets can affect the phenomenon and we know that different measures are used to identify the effect (trait ratings, attribution, frequency & recognition). We have seen that the ICs can occur with verbal and visual stimuli that were devoid of conventionalized social connotations and that different degrees of cognitive load do not seem to alter the effect. We have also seen that a debate seems to exist on whether ICs occur through memory-based or on-line cognitive processing and we have suggested that these two cognitive processes are part of a continuum rather than independent from each other. We would now like to pursue with concepts that relate to memory. As such, we will look at heuristics as well as the network model of memory. Finally, we will consider the need for adding two new variables to IC research: free recall as well as testing after a substantial delay of time. These will be introduced in the context of studying the link between the bias inherent to IC effects and the false memories that could stem from this phenomenon.

Heuristics

There is a wide body of research stating that salient information (i.e. cell D, in this experiment) is better encoded and remembered. For the most part, studies have concluded that salient stimuli are more available in memory making them easily retrievable and thus more prone to such biases as illusory correlations. Research on heuristics has regularly addressed the issue of the availability of stimuli in memory. Tversky & Kahneman, (1973) developed the concept of heuristics (availability, representativeness, anchoring, framing, simulation, etc.) to explain how humans use strategies for making judgments under uncertainty and how these strategies lead to error or bias. The social perceiver is virtually always using heuristics as a means of processing information rapidly and efficiently. The availability heuristic is a cognitive mechanism used to evaluate the frequency or likelihood of an event based on how quickly instances or associations come to mind. These authors note that when examples or associations are readily accessible and easily brought to mind, it inflates frequency estimates.

The availability heuristic (Tversky & Kahneman, 1973) is mentioned quite commonly in the IC literature since it involves frequency or probability judgments. Semin and Fiedler (1996) affirm that people generally overestimate the probability of an event if concrete instances of that event are easily accessible in memory. It is therefore easy to understand why ICs, the availability heuristic, and salience of stimuli are often jointly discussed in the literature.

The availability heuristic is used to explain various effects in the perception of individuals and social groups (e.g. Taylor, 1982). Minority groups and infrequent behaviours stand out and thus tend to be more distinctive. Hamilton and Gifford (1976) even argue that the availability heuristic could underlie the formation of stereotypes. Sherman and Corty (1984) went even further and stated that heuristics are not necessarily confined to group judgments; they are ubiquitous to most situations where cognitive processing is insufficient for the task being completed. On the other hand, Pouliot and Cowen's (2000) findings did not concur with evidence regarding the availability heuristic account of ICs because it was the non-salient, more frequent category of objects that was better remembered.

Other research on illusory correlations (e.g. MacDonald, 2000) suggests that the representativeness heuristic, rather than the availability heuristic, plays a role in the IC phenomena. This heuristic is defined as the tendency to assess the probability that a stimulus belongs to a particular class by judging the degree to which that event corresponds to an appropriate mental model (Semin, Fiedler, 1996). The judgment process using this heuristic involves determining the similarity between the sample event and some model representation, or prototype of the class, category or population to which the event is considered to belong. In an impression formation task, however, we must also consider the incongruency effect (Hastie and Kumar, 1979) which produces a higher recall rate for incongruent stimuli (behaviours), i.e. behaviours that are not at first glance representative of the general tendency of an individual's behaviour. Coats and Smith (Ch 14 in Hunt & Worthen, 2006) add that that incongruent information is processed more in an attempt to reconcile it with the expectation that target information should be coherent. In this sense, the incongruent information may strongly influence or dominate the mental model and make behaviours from that incongruous category seem more representative of the target than they would otherwise be.

The availability and representativeness heuristics both lead to systematic biases and errors in judgment and decision-making. However, it is also possible to discern their differences and to associate each with the two different types of ICs. The availability heuristic, which pertains to the ease at which events come to mind, is associated with distinctiveness based ICs where salient stimuli are processed at a deeper level and therefore recalled more easily. On the other hand, the representativeness heuristic, which is said to rely on prototypes for judgments, shares a similarity with expectancy based illusory correlations (i.e. judging or categorizing someone based on a model in memory). One must however note that both heuristics apply to a wide range of stimuli and that they are used to explain a variety of errors and biases in cognitive functioning (Semin & Fiedler, 1996; Sherman & Corty, 1984). The incongruency effect is also linked with expectancy-based ICs since incongruent stimuli triggers a process by which the perceiver attempts to incorporate that information into the existing impression. This process can include the retrieval of previously acquired information from long-term memory into working memory. As such, old and new stimuli are simultaneously considered (processed), which could result in a direct link between them in memory (Garcia-Marques & Hamilton, 1996).

Research on memory has clearly demonstrated that participants spend more time at encoding and are better at remembering salient or incongruent behaviour (Hastie, 1984; Srull, 1981; Wyer & Gordon, 1982). Correspondingly, Sherman and Hamilton, (1994) studied the associative network model of person memory in the context of impression formation. The model assumes that a target person is represented in memory by a central node, to which items of information become attached as they are encoded. The model also assumes that this associative activity occurs only during the encoding of impression-incongruent behaviours and not during the reception of impression congruent behaviours. Taking more time to process incongruent items would therefore leave a longer memory trace and in so doing, would make it easier to recall. As was suggested above concerning the incongruency effect, the authors found that incongruent information was processed longer and had a dominant memory trace.

Another issue involving the associative network model pertains to the type of recall used for the dependent measures. Most studies exploring the issue of ICs have used cued recall as one of their dependent measures in the so-called attribution task. Seta and Seta, (1990) have argued that free and cued recall may employ different cognitive mechanisms. For instance, during free recall, participants are free to generate any idiosyncratic or ad-hoc cues that come to mind. Recalling a behaviour may itself become a cue to recall another. Consequently, the associative links in memory may be solicited in any number of ways. On the other hand, cued recall may limit the search through an associative network causing participants to terminate the search much sooner (Seta and Seta, 1990). Free recall therefore would be an important measure to consider in IC research and it may add external validity since it is more similar to the process typically used in daily life.

Other memory issues are also pertinent to the IC paradigm. Abundant evidence from research studies and from everyday observations shows people that false information can make intrusions into memory and be considered true. Humans have a tendency to confuse factual observations with expectations, imaginations wishes or even dreams. Incorrect inferences are drawn from leading questions and suggestive exchanges. Mistakes, even if corrected, are sometimes overridden. Alternatively, corrections are interpreted as our own original judgment and finally, our encoding processes selectively confirm the sort of hypothesis that fits our own schema and stereotypical beliefs (Fiedler, Walther, Armbruster, Fay & Naumann, 1996). These memory intrusions may not appear to play a major role in distinctiveness based ICs since, theoretically, the stimuli presented are new to the participant. However, even with novel stimuli, certain pre-existing schemas will be activated by the stimuli that are presented. For example, in presenting a picture of a person engaged in a specific behaviour like washing dishes, the participant may have never seen the person before, but he most certainly has the prototype for that type of person and/or a schema for that type of behaviour. In fact, multiple schemas for the target person may be activated in the participant, ranging from schemas for physical characteristics, posture or facial expressions to schemas for environmental factors such as the physical location or the company he keeps. Similarly, the behaviours performed by this new person, unless very rare, will likely have been witnessed firsthand or vicariously (e.g. through the media) by the participant. Therefore, novel stimuli in IC experiments are in reality, a new combination of old information and therefore intrusions are always a possibility.

Dependent measures like free and cued recall could lead to different types of intrusion errors. Using a network model to describe the processes, free recall intrusion errors could stem from any number of associations made by a participant, whereas intrusions for cued recall would likely be guided from what was proposed. In fact, in the case of the attribution task used in IC research, the intrusions could all be misattributions of behaviour to the wrong actor (rather than an imagined or invented behaviour). Although both types of intrusions are cognitive, the first stems from information contained within the person and the second stems from suggested information, creating links that may not have been considered were they not proposed. Eyewitness testimony research has demonstrated that leading questions, like cued recall, lead to more false alarms (Fiedler et al, 1996, Steffens, & Mecklenbräuker, 2007). Likewise, using foils, as can be done in a cued recall task, may "implant" information in the person's network of links. When a participant is presented with a cued recall task where the assignment is to recognize the previously presented stimuli, he will have to consider all the stimulus material and decide whether they were part of the original set. According to Loftus

(1975), post-event suggestions create transient representations in memory, which are then incorporated in the representation of the original information. Even if the participant recognizes the foil and dismisses it, traces of transient representation may remain and continue to affect memory in subsequent recall and judgments.

The concept of transient representations in memory does not yet seem to have been applied to IC research. Research is usually conducted by presenting participants with a series of stimulus material and taking dependent measures shortly thereafter. Applying Loftus's (1975) theory of transient representations would mean that subsequent testing, say one week later, might affect memory for the stimuli. In fact, no research on ICs has tested whether false memories develop because of prior biased judgments. Loftus posits that trace information may affect subsequent memory, but it remains to be seen if such traces are strong enough to actually bias memory when using the IC paradigm. In essence, the present research seeks to determine if the IC effect that is formed just after the initial presentation of the stimuli (i.e. at T1), would be strong enough to create intrusions (i.e. false memories) one week later (i.e. at T2). Such a finding would indicate that false memories could perpetuate or increase with time. On the other hand, time may have the opposite effect on illusory correlations. Since the ratio of majority to minority stimuli presented is two to one, time may in fact augment the probability that participants remember stimuli from the majority category. As previously stated, no study has yet included a time component in IC research. The present study will attempt to clarify the nature of such intrusions and their relation to ICs by measuring cued recall (on the attribution task testing IC effects), recognition (as was done by Pouliot & Cowen, 2000) and free recall (which has never been used before in IC research.

Summary

At the beginning of this chapter, we presented the six main objectives of this research. Our first objective was to determine if we could produce the IC effect by using two target individuals performing positive and negative behaviour instead of two groups of persons or inanimate objects. Many studies that used similar paradigms as the one created by Hamilton and Gifford (1976), have managed to produce the effect. The one previous study that presented stimuli depicting individuals did not produce the effect. Since their method differed quite substantially from the original paradigm, the present study will attempt to determine if their negative findings were due to their atypical methodology.

The second objective is to determine the role of memory in producing IC effects. In order to understand this more clearly, we are measuring memory directly and independently of our IC measures. A recognition test, as used by Pouliot & Cowen (2000) will be used again, but we are also adding a free recall test, which can be compared to results for recognition and cued recall on the attribution task.

Our third objective is to determine the course of ICs over time and to see whether false memories develop from an initial IC effect. Including a time factor is novel to the field of IC research since all studies have focused on measuring the effect immediately after stimulus presentation. By re-testing IC and memory one week later, we can see if the IC effect is reduced, augmented or stable in time and if these changes coincide with the development of false memories.

Our fourth objective is to determine if the medium of presentation has an influence on illusory correlations. Nearly all of the studies in this area have used the verbal medium of presentation. One of the studies described above, managed to produce the effect by presenting photographs of inanimate objects that had no social connotations. The present study will be the first to determine if a visual medium has an effect on the perception, memory and attribution of positive and negative behaviours to individuals.

Our fifth objective aims to determine if the illusory correlation effect which was found with group targets when the valence of the stimuli was reversed, extends to individual targets. In previous research with group targets, reversing the valence of the stimuli such that cell D (i.e. minority group combined with minority behaviours) is positive has produced an IC effect with verbal presentations. Once again, the present study aims to see if this effect with reversed valence generalizes to individual targets and to visual presentations. The present study will compare results when cell D valence is positive (the so-called 'experimental salience' condition, ExS, in the present study) with results in the more typical or "real-world" salience condition (RwS) where positive behaviour is the majority and cell D corresponds to negative behaviour.

Our last objective aims to determine if different task sets have an effect on the IC phenomenon. Most studies have assumed an impression formation process underlies the IC effect, which is measured by attributions and frequency estimation tasks commonly used as measures of illusory correlations. As we have seen, some researchers have stipulated that the IC phenomenon is memory based while others stipulate that it is an on-line process and still others say it depends on the type of stimuli used (i.e. groups or individuals). What's more, if as proposed, both on-line and memory based cognitive strategies are used, it remains to be determined, which is predominant. By directly varying instruction and orienting participants to different tasks (memorizing information vs. forming an impression) we hope to elucidate how these different processes contribute to ICs and verify their impact on memory.

For this study, we have devised a series of 11 hypotheses, which are listed below. Some are more general in nature; others pertain to the independent variables, while still others pertain to interaction effects. The hypotheses are divided in two major categories: those pertaining to IC effects and those pertaining to memory effects.

Hypotheses

In order to avoid confusion about terminology, please note that the expression "verbal stimuli" refers to sentences describing one of the two target persons performing a behaviour, e.g. "Alex is reading a book". Conversely, the expression "visual stimuli" refers to photographs (slides transferred to Power Point and projected for presentation) depicting a target person performing a behaviour, e.g. a slide of Alex reading a book.

Hypotheses concerning illusory correlation effects using attribution and frequency estimation measures

General hypothesis for overall illusory correlation effect:

H1

Using a nearly identical paradigm to Hamilton and Gifford's (1976), but using two individual targets instead of two groups of individuals, there is an IC for the salient target performing salient behaviour (i.e. cell "D" stimuli). Furthermore, this phenomenon occurs without giving participants prior instructions as to the status (majority or minority) of the targets or by having them specifically focus on one target in particular.

<u>Primary hypotheses concerning the major variables:</u>

Effects associated with the medium of presentation:

H2

Following Pouliot & Cowen's (2000) findings, we predict that IC effects occur when using either visual or verbal stimuli. However, given the greater vividness and concreteness of photographs compared to sentences, we expect that visual stimuli reduce the IC effect.

Effects associated with the type of salience:

H3

As found by Hamilton and Gifford (1976, experiments 1&2), we predict that IC effects occur for both real-world salience (where cell "D" contains negative behaviour) and experimental salience (where cell "D" contains positive behaviour). However, since real-world salience combines the effects of negative valence and distinctiveness at the same time, we expected IC effects to be greater in this condition than in the experimental salience condition.

Effects associated with the task set orientation:

H4

Following the findings of Sanbonmatsu , Sherman and Hamilton (1989), we predict that the IC effect is stronger for the impression formation task than for the memory task. This is predicted because inconsistent salient information has a greater impact when the impression and evaluation task is explicit and participants do not have pre-determined expectations about the targets, as shown in Stangor and McMillan's (1992) meta-analysis.

Effects associated with time:

H5

We expect the IC effect to increase at time two compared to time one. Since memory decreases over time, we surmise that participants would remember fewer numbers of items at T2. However, since salient stimuli should theoretically be better remembered, they should have a greater influence than non-salient stimuli at T2, thus facilitating an IC effect.

<u>Secondary hypotheses concerning interaction effects:</u>

Two-way interaction

H6

A two-way interaction between task set (impression vs. memory) and salience type (ExS vs. RwS) is predicted because the stronger effects of salient negative behaviour (compared to salient positive behaviour) should be yet more pronounced when there is an impression task which should produce more of an IC effect than the opposite combination (positive salience and memory task).

Three-way interaction

H7

A three-way (task set x salience type x time) interaction is expected since decreases in memory occurring at T2 would represent a further increase in the differences on IC measures that had previously been observed at time one.

<u>Memory effects using recall and recognition measures</u>

It should be noted that when prior research has explained IC effects in terms of memory, the tendency has been to suggest that salient stimuli are more available at the time a judgment is made (i.e. memory-based impressions). Aside from Pouliot & Cowen (2000) there has been little or no mention and / or measure of false alarms. As previously stated, the strongest arguments in favour of memory as a cause of ICs should consider both hits and false alarms. It is worthwhile noting that although the attribution task is in effect a cued recall task (and therefore a memory measure) it does not permit one to look at both hits and false alarms because in that task the two are not independent, i.e. each time there is a miss in cell B (lowering the hit rate for that cell) there is automatically a false alarm in cell D because the false alarms indeed result from the misses in the adjacent cell. In contrast, the data from the recognition task and the recall task do not suffer from this shortcoming, i.e. a miss in one cell does not automatically become a false alarm in the adjacent cell (and vice-versa).

Hypotheses concerning the major variables:

Effects associated with the medium of presentation:

H8

As was observed by Pouliot and Cowen (2000) we expect that participants are significantly better at overall detection of false alarms in the visual condition. These authors also found better foil detection (i.e. less false alarms) for the less frequent stimulus category. However, they did not measure false alarms rates with regard to individual cells. In the present study we can measure false alarms rates in recognition as well as confabulation and errors of commission in recall in each of the four cells. Once again, the strongest evidence that IC is based on memory would be seen in a higher hit rate and false alarm rate for cell "D".

Effects associated with the type of salience:

H9

Given that negative behaviour is generally more influential in social perception and judgments, we expected real-world salience to produce a higher hit rate for cell "D" when compared to the hit rate for the same cell in the experimental salience condition. In a similar vein and as expressed in H-8 we expect the false alarm rate for cell "D" in the real-world salience condition to be higher than in the experimental salience condition.

Effects associated with the task:

H10

Prior research has clearly shown that recall of information is better when it is presented in an impression formation task as opposed to a memory task (Hamilton & Rose, 1980). However, false alarms have not been studied to any great extent. Since we expected IC effects to be greater for the impression formation task, the strongest evidence that IC is memory-based would be found in an increased false alarms rate and increased hit-rate for cell "D", which is what we anticipate.

Effects associated with time:

H11

Previous studies have shown that recall decreases in time (see Fiske &Taylor, 1991). We hypothesized that this experiment's recall measure would also show a decrease with time, more so than for the recognition measure. This effect should be yet greater for non-salient stimuli. Conversely, hit rates for cell "D" were expected to be proportionally higher at T2 compared to T1 more so than the other cells in the array. False alarms were also hypothesized to be greater at T2, when an IC effect was observed at time 1. In other words, there will be a proportional increase in false memories at T2 associated with the exaggerated judgments regarding cell "D" items at T1. Recall measures should be more sensitive to these influences than the recognition measures.

CHAPTER II

METHOD

Paradigm

Throughout the text, we have mentioned that we will be using the paradigm developed by Hamilton and Gifford (1976). We made four slight modifications to the paradigm. First, Hamilton and Gifford (1976) used 39 sentences in their stimulus array. We chose to use 36 stimuli instead of 39. This decision is also supported by a number of facts. First, as can be seen in the meta-analysis by Mullen and Johnson (1990), more than 35% of the studies cited used 36 stimuli instead of 39. They do not mention anywhere that this affected results. In addition, Pouliot and Cowen (2000) used 36 stimuli in their array. Since the current study is partly inspired by their initial attempt to measure recognition as well as ICs, we thought it would be wise to maintain their choice of 36 stimuli since we will also be examining the role of memory in producing IC effects. Second, by using 36 stimuli we can maintain a neat 2:1 ratio for both of the two dimensions in the 2x2 array, whereas using 39 stimuli would create a ratio of 2:1 when comparing actors (cell A vs. C or B vs. D) but a ratio of 9:4 when comparing majority and minority behaviour. Thus, with 36 stimuli, there is symmetry for the two dimensions and individual comparisons of majority and minority cells on either dimension would be based on an equivalent number of stimuli in the cells being compared. While doing this we wanted to preserve the minimum amount of four stimuli in cell D, which appears in all studies using this paradigm. Therefore, if cell D was to have four stimuli, the 2:1 ratio determined the stimulus quantity for the other cells of this more elegant design as we can see in table 2.1 below.

The second modification was for stimulus type, as dictated by one of the main objectives of this study. Instead of presenting different members from two groups of people, each of whom behaves either positively or negatively, we presented different behaviours of two individuals, each behaviour being either positive or negative.

Table 2.1

Two by two (2x2) distribution of behaviours for each actor

	Majority Behaviour (majB)	Minority Behaviour (minB)
Majority Actor (majA)	Cell A 16 stimuli	Cell B 8 stimuli
Minority Actor (minA)	Cell C 8 stimuli	Cell D 4 stimuli

The third modification involved the instruction set. We deleted any mention pertaining to the quantity or quality of stimuli about the two individuals that were going to be presented. This modification was included so that participants would not form an initial bias before viewing the stimuli and so that the stimulus array would be as close as possible to "real-world" stimuli where people would not necessarily be cued into witnessing stimuli.

Our last modification was to give participants an orientation toward impression formation or toward memorizing information by asking them to perform a consolidation task after each stimulus was presented. This modification was based on a method employed by Fiedler, Russer and Gramm (1993) who used it to control the way in which participants cognitively processed the information, which was precisely our goal here.

Finally, we added a time component to this research. One week later participants were tested again for IC effects and for memory of the stimuli in the original array. Thus, with a comparable paradigm as the one used by Hamilton and

Gifford (1976) we devised an experiment where ICs could be measured for individuals in a repeated measures design. As such, we have a 2 (visual (Vis) medium vs. Verbal (Ver) medium) x 2 (impression (Imp) task set vs. Memory (Mem) task set) x 2 (real-world salience (RwS) vs. experimental salience (ExS) design as depicted in table 2.2. In half of the groups, the 36 stimuli were presented verbally, whereas in the other half the stimuli were presented visually. Each of these conditions were divided into two sub groups, one in which the consolidation task oriented participants toward forming an impression of the two actors, the other in which the consolidation task oriented participants to memorizing the information about the two actors. For each combination of medium and task set, half the participants were presented with 36 stimuli in which the salient (minority) behaviour of both actors was negative, corresponding to the real-world salience condition (since in general people expect others to be good). The other half of participants were presented with 36 stimuli in which the salient behaviour was positive, corresponding to the experimental salience condition (ExS). This condition was invented in the classic experiment of Hamilton and Gifford (1976 exp. 2). It is contrary to people's general expectations about others' behaviour and is not typically encountered by the average person in his day-to-day life in the real world. Consequently, there were eight experimental conditions. However, in order to control for the possibility that the actors' names or faces might create an experimental effect independently of the behaviours or their proportions, we counterbalanced the groups. As such, the design (2x2x2) was tripled and the experiment required testing 24 groups in total.

Participants

Participants consisted of 292 English speaking CEGEP students. The dean was contacted and asked for permission to conduct this study. Permission was officially granted by the college's deontology committee. Included with the request was a general summary of the study as well as a detailed account of the method and the procedure. After obtaining a written authorization to collect data that was valid for two years, we contacted two psychology teachers at that school who agreed to lend a hand for this project. The project was fully described and they allowed the experiment to be conducted during class time.

Table 2.2

Experimental conditions of study

* Consolidation task (impression or memory) only at time one

Groups/ conditions	N	Medium	Task	Salience	Time 1 * All dep. measures	Time 2 All dep. measures
1	19	Ver	Imp	RwS	√	√
2	22	Ver	Imp	ExS	√	√
3	20	Ver	Mem	RwS	√	√
4	20	Ver	Mem	ExS	√	√
5	24+20	Vis	Imp	RwS	√	√
6	26+25	Vis	Imp	ExS	√	√
7	18+28	Vis	Mem	RwS	√	√
8	41+29	Vis	Mem	ExS	√	√
TTL N	292					

Note: we have two sets of N's for groups 5-8. These represent eight classes tested in the visual conditions. This is part of a counterbalancing procedure, which is explained in the procedure section.

It was arranged with the participating teachers for the experimenter to be present at the beginning of class and ask students if they wanted to participate in the study. They were told that the study was about social perception (see appendix

H). It was clearly stated that participation was voluntary, independent of course or grade and that they were free to end their participation at any time without prejudice. The teacher also corroborated this information. As a means of trying to maximize student collaboration and to increase the probability they would return for the second phase a week later, they were informed that upon completion of the study, they would be eligible to a $50 dollar cash prize draw.

Most students agreed to participate in the study in all the classes that were solicited. In fact, of all classes, only three students did not initially wish to participate. Each class represented one experimental condition. The classes were mostly comprised of 25-30 students. Each read and signed a consent form (see appendix A). The ratio of females to males was 2:1, and the age range was from 17 to 25, averaging 18.50 yrs. This ratio is commonly found in psychology classes.

Apparatus

Construction of stimulus material (photographs and sentences)

Pre testing enabled us to find two male actors that were distinct from each other but of approximately the same age and build. In order to verify this assertion, a picture of each actor was shown to twenty judges who were unaware of the present study or of the actor's potential role in this research. The sample pictures of the two actors were of face and upper body facing front. The actors adopted a neutral pose (i.e. not smiling nor frowning), similar to what is asked for a passport picture. Students were asked to rate the actors on a series of four traits (*Intelligent, confident, suspicious* and *shy)* which was inspired from Hamilton and Gifford (1976). The twenty students were also asked how confident they were about being able to differentiate the two actors from each other.

Subsequently, a series of more than 120 photographs was taken of the two actors and presented to another group of twenty judges. Their task was to identify the behaviours depicted on each photograph. In addition, the judges were asked to rate the likeability of the behaviour using a nine-point Likert-type scale going from -4 (extremely dislikeable) to +4 (extremely likeable). This permitted detection and exclusion of ambiguous photographs, i.e. those rated between -1 and +1 and those rated as extreme, (i.e. -4 or +4). Deleting photographs that were rated extreme or ambiguous was done to respect the original stimuli presented by Hamilton and Gifford (1976) as well as other research done in this field. Our interest went toward showing that ICs are adaptive, common and can be generalized in society.

From these 120 photographs, 48 were chosen for each actor; 24 showed the actor performing a positive behaviour and 24 showed him performing a negative behaviour. From the two sets of 48 photos, we constructed subsets of 36 such that 24 photos showed 1 actor and 12 showed the other actor. The matching sentences were used for the verbal condition of the study. The sentences came from the picture descriptions given by the 20-person group during the pre-test. The behavioural descriptions were incorporated into a simple declarative sentence such as “Alex is breaking a CD” or “Chris is dusting the TV”. Two independent judges compared the sentences with the corresponding photographs to certify that the simple declarative sentences matched. There was perfect inter-rater reliability. Having the 48 photographs or sentences, of which 12 or 24 could be chosen for a stimulus set allowed sufficient stimulus material to prepare the extra sets needed for counterbalancing.

To insure a lack of bias in the presentation, the 36 stimuli were divided into a stratified random order. That is, four blocks of nine stimuli were created such that each block respected the overall proportional representation of the four stimulus sub-categories in the total set (i.e. four from cell “A," two from cells “B” and “C," and one from cell “D”). The particular stimuli and their order within any block were randomly determined.

Testing instruments: computer, projector, screen, questionnaires

The CEGEP was kind enough to provide a computer and a projector for testing purposes. An HP Pentium II desktop computer and Canon projector (model LV-X4) mounted on a rolling cabinet was available for each classroom used for testing. Each room was also equipped with a roll down projection screen measuring approximately six square meters (2.5m. x 2.5m.). The size of the picture projected on the screen was approximately one meter by one point three meter, (1 x 1.3).

This was more than adequate for the small rooms in which the experiment was conducted. The font size for the sentences was 44 and we used a Times New Roman letter type. The classrooms were eight meters deep by six meters wide and the projection screen was on the six meter wall in the front of the classroom. The classroom lights were dimmed at the front when the stimuli were being presented. Each participant had an unobstructed view of the screen and each reported having no difficulty either reading the sentences or clearly seeing the information on the pictures. It should be remembered that this screen size was perfectly adequate for viewing in this room since it was installed exactly for the purpose of permitting all students to see classroom presentations when using a computer and projector. Stimuli were presented on slides created using Microsoft Office 2003 Power Point.

Booklets

All data for the dependent measures were collected on paper. Each participant was given a booklet consisting of 8½" x 11" sheets of paper stapled together (see appendix A through G). A consent form was used as a cover page and participants were asked to read it as the booklets were being handed out. Participants were told to keep the booklets unopened in front of them. Once all the booklets were distributed, the experimenter read the consent form aloud to the participants, answered their questions and then asked those who wished, to sign the consent form. Once again, participants were assured that leaving or not participating would cause no prejudice. All booklets were printed with a laser quality printer/copier.

To insure anonymity, participants had only to write their names and sign on the consent form. No other sheet contained participants' nominal information. At time two, a second booklet was given, which included a title page, so they could write their name on it. Once the questionnaires from T1 and T2 were matched, the consent form from T1 and the title page from T2 were removed. A ballot form located at the bottom of the last page was also removed (cut out) from the booklet. To insure anonymity and unbiased treatment of the questionnaires, the person matching the questionnaires and cutting out the ballot form was independent from the experimenter and independent from the person involved in data entry.

Dependent measures

Four dependent measures of which two traditionally measure IC (attribution of behaviours to actors and frequency estimation of minority behaviour) and two traditionally measure memory (recall and recognition), were obtained twice. These measures were first obtained shortly after the stimulus presentation (i.e. at the same sitting) and then one week later. Repeated measures are common in memory research but non-existent in IC research. The second testing allowed us to determine, as previously mentioned, if false memories develop over time, particularly because of prior biased judgments.

Attribution

The attribution task (see appendix F), asked participants to read in a randomized order, descriptions of each behaviour performed in the original stimulus set. Two columns appeared next to the 36 descriptions where participants had to put a check mark in the column assigned to the actor whom they thought performed the behaviour.

Frequency estimation

Also common in IC research, participants were administered the frequency estimation task (see appendix G). In this task, participants were given the total number of behaviours performed by each actor and their task was to give the number of minority behaviour (stated as ‘negative’ for real-world condition or ‘positive’ for the experimental salience condition). The quantity they had to determine corresponded to cell B and cell D.

Free recall

The free recall task, commonly used in memory research, essentially asked participants to write down as many of the behaviours as they could remember from what was presented. Participants were presented with a sheet of paper on which two columns appeared; one titled “Alex," the other “Chris” (see appendix D), on which they wrote down in the appropriate column all the behaviours they could remember (i.e. who did what). If participants remembered the behaviour but not the actor, they were encouraged to guess which actor did it and write it down in the appropriate column (based on McConnell, Sherman & Hamilton, 1994).

Recognition

In the recognition task (see appendix E), participants were asked to identify the sentences corresponding to the stimuli originally presented. In this task, thirty-two sentences were presented; sixteen sentences from the original stimulus set to which 16 foils were added. The foils respected the same criteria used for selecting the original stimulus material (i.e. non-extreme and easily identifiable). Determination in the number hits and foils (16 of each) was based on the quantity of stimuli for cell D. Since four was a maximum quantity of behaviours in cell D, it was determined as the basis of presentation for every other cell (i.e. 4 hits + 4 foils). Conserving the original 2:1 proportions and replacing half the behaviours with foils would leave two hits and two foils in cell D. The statistical representation of such low numbers would have made it impossible to differentiate it from error margins. The possibility of presenting 36 hits and 36 foils for a total of 72 sentences was also considered to be dissonant with the other tasks in addition to making it a very tedious and lengthy exercise.

Dependent measures at time two

One week later, participants were again asked to fill out the same questionnaire that included the four dependant measures. This time however, participants were not shown the original series of 36 stimuli.

Order of presentation

The specific order in which the different tasks were presented was of important consideration. Free recall was done first so that participants did not benefit from priming effects of reading behaviour descriptions used in the other tasks. The recognition task was chosen to follow because this task presented only half of the stimulus set. In third place came the attribution task. This was the first time that participants were presented with all the stimulus material that had originally been presented. The frequency estimation task came last since this task required participants to be told of the number of stimuli presented for each actor. It was estimated that this order of presentation would create the least amount of influence, or bias in participant's answers.

Procedure

Counterbalancing of groups (visual and verbal)

Eight different conditions were to be tested: four in the verbal condition and four in the visual condition. In each condition, we counterbalanced for name and actor thus controlling any bias. We obtained a two-year testing permission at the CEGEP. We therefore planned a schedule to test four classes per term (fall and winter) for the two years. This meant that we could test 16 classes allowing us to counterbalance each of the eight groups / conditions with another intact group to complete the experiment.

In our first year, we tested the visual condition of the experiment. Four groups (see table 2.2 for N's) were presented with pictures where actor number one was depicted as the majority actor (i.e. 24 slides) whereas actor number two was the minority actor (i.e. in 12 slides). Another four classes were presented with a different stimulus set where actors were reversed. Actors' names were not superimposed with the pictures presented on the screen. Rather, each booklet containing the dependent measures included one page at the beginning where both actors' picture and names appeared. This allowed half of each group to receive questionnaires where actor number one was identified as Chris while the other half received questionnaires where actor one was identified as Alex.

We encountered a setback during the second year of testing. We were allowed to test for one semester instead of two. For logistical reasons, we decided against asking another permission to extend testing for another term. We therefore had to divide our four classes. Half of the participants in each class were brought into a nearby classroom where a second trained experimenter, conducted the study with the second stimulus set. This allowed the same type of counterbalancing than in the visual condition. The only caveat was that the total number of participants would not be as high as in the visual leg of the study.

Presentation of stimulus material

In the visual condition, participants were presented with a set of 36 colour picture slides depicting either Alex or Chris involved in either a positive or a negative behaviour (as depicted in table 2.1). Each slide was preceded by an audible 'beep', in order to cue participants to look at the screen for the whole eight seconds while the slide was being presented. After which, a completely white slide (blank) would appear for another eight seconds, giving participants enough time to complete the consolidation task (detailed below). The same procedure was used in the verbal condition, except the stimulus slide contained a short sentence describing a particular actor and behaviour. (e.g. Alex cleaned the table), also followed by an eight-second blank slide.

Instructions in the different conditions

Instructions varied by condition. For media, participants in the verbal condition were asked to read the sentences that were presented on the screen, whereas participants in the visual condition were asked to look at the picture being presented on the screen. Instructions also varied by task. After presentation of each slide (i.e. while the eight second blank screen was presented), participants had to do a consolidation task designed to promote either memory-based or impression based cognitive processing. Participants in the "memory" condition had to write down a few key words on paper provided in the booklet in order to help them remember what they saw or read (see appendix B). A boxed line was provided for every stimulus and participants were instructed to start at the top and go down the page one line at a time. Instructions stipulated that both behaviour and actor were important.

For the impression condition, the instructions consisted of asking participants to complete the sentence: 'This behaviour contributes to a ________________ impression of the person'. Participants had to write either 'positive' or 'negative' after each slide. The instruction booklet (see appendix C) provided a sheet with a series of boxes in two adjacent columns that corresponded to the total number of answers to be given. Once the first slide was presented, participants had to write either "positive" or "negative" in the top box on the left hand side of the page.

Each new slide had participants write their answers in the box underneath the previous answer. Once the first column was completed, participants started at the top of the second column and worked their way down until the task was complete.

Participants had ample time to write in their booklets while the eight-second blank screen was presented. The audible 'Beep' cued participants to look back at the screen for the new slide. The remaining independent variable involved presentation of stimuli where negative behaviour was in the minority (Real World Salience, RwS) or where positive behaviour was in the minority (Experimental Salience, ExS). There were no special instructions for this condition. Participants had to look at the screen and complete the task. It was the stimulus set that changed.

Tasks

The four tasks were sequentially presented in the participant's booklets. At the beginning of each task, the experimenter read the instructions aloud for that specific task. Participants were asked to follow along since all instructions were included in their booklets. The experimenter would then answer any questions pertaining to what participants had to do for that task. Subsequently, participants were asked to proceed with the task. Once the allotted time was over, they were asked to put down their pens or pencils and wait for further instructions. When the first task was completed, instructions were read aloud for the second task and so on until all four tasks had been completed. We had some restraints about testing groups of people in one sitting. The risks of adding "noise" or bias such as participants copying answers or making comments aloud were considered. The instructions were clear and asked participants not to flip either forwards or backwards through the pages of their booklets. Great care was taken to alert participants so they would not derogate from the instructions. The experimenter, standing at the front of the class, could easily see anyone that did not follow instructions. He also stressed the individual nature of the exercise.

Time one.

Each class of 25-30 people represented one experimental condition. Presentation stimuli and questionnaires were matched according to the specific experimental conditions for each group. In all groups, the experimenter first explained the general nature of the experiment (appendix I). Each of the dependent measures was fully described prior to the task itself. After instructions were presented, students were asked to sign a written consent form if they intended to continue participating and to fill out socio-demographic information (name, gender and age). It was stressed that all information and responses would remain completely anonymous.

Participants in the visual condition were invited to turn to the next page of their booklets and study the two laser printed photographs provided. The photographs depicted the two actors who were to be subsequently presented in the stimulus array. The actors' names were printed on each photograph such that half the class was informed that the first actor's name was Alex and the second actor's name was Chris, whereas the names were reversed for the other half of participants in that class, thus allowing for counterbalancing (as explained above). Participants were asked to study the photographs until they felt comfortable distinguishing between the two actors and their names. One minute was allotted for this brief study period.

In the verbal conditions, only the names of the two actors had to be counterbalanced. To do this, approximately half the participants in a class were presented with sentences where Alex was the majority actor while the remaining participants from that class, who were in a different classroom, were presented with sentences where Chris was the majority actor. Determination of sub-group membership was determined randomly by distributing small pieces of paper containing either a circle or triangle and informing participants with one of the symbols to proceed to an adjoining room where they were given the appropriate questionnaire to permit counterbalancing. In all verbal and visual groups, general instructions plus presentation of the 36 stimuli along with the appropriate consolidation task (depending upon the particular task set condition for the group, i.e. "impression" or " memory" took 12 minutes to complete.

Once the stimulus presentation and the consolidation task were completed, the experimenter invited participants to turn to the next page of their booklets and again read aloud the instructions for the following task where participants had to recall the stimuli that had just been presented. After any questions pertaining to the task were answered by the experimenter, participants had to write down all they could remember from the presentation (appendix D). They had to recall behaviour as well as the actor that performed it. Participants who did not remember the actor were encouraged to guess which actor performed the behaviour. It took 10 minutes to complete this task. The last incidence of a written response being entered by a participant was always before the allotted time.

Following this, the experimenter read aloud the instructions for the recognition task in which participants had to read a series of 32 behaviour descriptions, half attributed to the majority actor, half to the minority actor. Half of the 16 descriptions for each actor were in the original stimulus set presented at the beginning of the experiment and half were foils that closely resembled the original stimuli (e.g. "Alex fixed a broken toy"). The items were selected such that there were four hits and four foils for each of the four cells (A,B,C and D). Participants had to read each sentence and then say whether the behaviour was presented or not (see appendix E for instructions). This task took eight minutes to complete giving participants 15 seconds to decide about each individual stimulus.

The experimenter then read aloud instructions for the attribution task, which presented the 36 behaviours in the original stimulus array, but this time without any actor associated with each behaviour. Participants had to read each behaviour (presented in a random order) and decide if the behaviour was done by Alex or by Chris. They were instructed to put a check mark in the appropriate box next to the behaviour (see appendix F). This was the first time that participants were presented with the integral content of what had actually been presented on power point at the beginning of the experiment. It took participants nine minutes to complete this task. In other words, each of the 36 attributions of behaviours to one of the two actors was allotted approximately fifteen seconds.

The last dependent measure was determined by the frequency estimation task in which participants were asked to estimate the quantity of minority behaviour performed by each actor (appendix G). Once again, after the experimenter read the instructions aloud and answered questions about the task, participants were given the total number of stimuli performed by each actor. Their task was to estimate the amount of these totals that were either negative behaviours (for the RwS condition) or positive behaviours (for the ExS condition) for each actor. These estimates correspond respectively to cells B for the majority actor and cell D for the minority actor. It took less than 30 seconds for participants to complete this task.

Throughout the entire experimental procedure, participants were reminded that this was an individual exercise, that results would be anonymous and that participants would not be compared to one another. Furthermore, participants were also reminded to concentrate on the task and not to look ahead or back in their booklets. The administration of the whole procedure took approximately 40 minutes.

Time two (one week later)

Each participant was tested a second time one week later. At this time, participants were not presented the original set of 36 visual or verbal stimuli. Instead, the experimenter began by reminding participants about the general guidelines of the study (appendix J). Booklets containing the recall, recognition, attribution and frequency estimation tasks, in that order, were again handed out. The same procedure was used as at time one. That is, participants were read instructions for each task and then asked to complete it. In contrast to time one, questionnaires in the visual condition did not include pictures of the two actors; participants had to rely on what they remembered from the week before in order to complete the dependent measures.

On the last page of the questionnaire, participants were asked to fill out a ballot, which entitled them for a fifty-dollar cash prize. This was in fact the only incentive used to increase our chances of having participants complete both parts of the study. A third party (i.e. a person who was completely uninvolved in the study) matched the questionnaires. Once the questionnaires from T1 and T2 were matched, consent form, title page and ballot were detached again by this third party. Nominal information was kept separate and under lock and key. Ballots were accumulated throughout the year and a draw was made at the end of each year.

Note that all groups, (i.e. those in the visual and in the verbal conditions) were asked to complete the dependent measures in a written form (i.e. pencil and paper). This procedure may be construed as a compromise compared to an experimental procedure where those in the visual condition would be presented with photographs on the attribution and recognition tests. However, this procedure was considered advantageous because it controlled the condition by which dependent measures were obtained and served to replicate methods previously used in IC research and memory research.

Preparation of raw data for analysis

The counterbalancing procedure revealed no differences for name or for actor; data was therefore combined for analysis.

The different dependent measures required different preparation for data analysis. In the consolidation task for the impression formation condition, participants were required to write down either 'positive' or 'negative' on their answer sheets. In the memory condition, participants had to write down a few key words on their sheets. Participants also had to write a few words in the recall task. For these instances, we asked a judge who was blind to the study, to rate all the answers given by participants.

When checking all questionnaires for the consolidation task in the impression formation condition, the judge discovered three questionnaires where participants were apparently not serious in their answers. For these questionnaires, participants had written down "negative", in all boxes. In another, a participant had written words other than what was required. These questionnaires were deleted from the study. The judge also verified the memory consolidation task. In this case, it was more difficult to determine if the words were adequate (unless flagrant) since participants had free choice of writing down their own key words for the stimulus presented. Only one questionnaire consistently contained key words that had no apparent connection to the presented stimuli and it was taken out of the study. One thing that was commonly found in the memory consolidation task was that participants seemed to have enough time to write most of the short sentences that had been presented.

With regard to the dependent measures, the recall task asked participants to write down what they remembered for each actor. Two independent judges verified each of the answers. They then compared notes to ensure uniformity. Approximately a dozen words had to be deciphered because they were badly written. A consensus was nonetheless obtained by these two judges. The other tasks were binary in nature and involved check marks so no interpretations were needed. Nonetheless, we excluded six questionnaires when entering the binary tasks. Some had not been completed to the end and some, again, where participants put check marks in only one column.

Data was entered on an Excel 2007 worksheet. All data for one participant was entered in a single row starting with experimental group, age, sex, consolidation and each individual answer for every task at time one followed by all the answers for time two. The written answers for the recall task were coded. By doing so, we differentiated between 1) Hits: right behaviour right actor 2) Miss: right behaviour wrong actor and 3) inventions (errors of commission): when the behaviour was not in the original set of stimuli presented. We had originally differentiated between recall misses (errors of omission), inventions for Alex and inventions for Chris, but the quantities were too small for any of the categories, making any statistical test untenable. The three types of error were therefore combined and their total accounted for less than ten percent of all the answers for the recall task. These combined inventions and wrong answers were named Recall error. Consequently, the recall task was comprised of two measures; one for hits (correct actor and behaviour) and one for errors (combination of right behaviour wrong actor and inventions).

The recognition task was also designed to provide two separate measures. The first, Recognition hits, measured the number of correctly recognized behaviours on this task from a subset of four behaviours per cell in the original array. The second, False alarms, measured the number of incorrect identifications of foils (among four invented items per cell) as having been in the original array of 36 stimuli. The next task in the booklet, the attribution task, provided a measure of the rate of correct attributions of behaviour to each actor and each behaviour category. We named this measure attribution hits, but our interest is really in misattributions, i.e. the misses in any given cell that, because of the forced choice nature of this task, automatically become errors in the adjacent cell for the other actor. Finally, in the frequency estimation task, after being given the total number of behaviours for each actor, participants estimated the number of behaviours for each that were in the minority (these are by definition the negative behaviours in RwS and the positive behaviours in ExS). This measure was named Frequency hits, although clearly the numbers obtained can be in error, i.e. either overestimates or underestimates of the true number of minority behaviours.

To summarize, there are in fact six different measures obtained from the responses on the four tasks: for recall we have hits and errors, for recognition we have hits and false alarms; for attribution we have hits (or the reciprocal, which is misses) and for frequency estimation we have "hits" as perceived by the participant. All measures were transformed into proportions. For example, a participant who correctly estimated the frequency of the minority actor performing the minority behaviour (cell D) to be 4 (out of the possible 4) was given a score of 1.0 or 100%. Likewise, a participant who attributed three out of twelve behaviours to the minority actor performing the majority behaviour was given a score of 0.25 or 25%. A total of 292 questionnaires were retained for analysis.

Test of assumptions for parametric analyses and normality

Testing went according to what is presented in table 2.2. All participants in one class were tested for one condition. The first class to be tested was visual-impression-real-world then visual- impression-experimental salience and so on.

We followed the order as presented in table 2.2, except that we did the visual conditions first.

It would be difficult to state that participants were randomly assigned since a whole class took part in one condition. Nevertheless, there was no experimenter bias in determining who the participants in any given class were. In addition, we had no control over the classes that were arranged for us. In essence, the randomness of the participants encompassed the class as a group and not each individual in the class.

All of the data were comprised of continuous variables and distributions for each variable were submitted to univariate normality tests. It was found that three specific measures did not meet the homogeneity of variance criteria for ANOVA, whereas three others did. Log transformations were therefore done on Recall error, Recognition of Hits and False Alarms. Post- hoc tests were done using McNamar's test, (Wonnacott, T.H. and Wonnacott R.J 1991).

CHAPTER III

RESULTS

This study is concerned with the IC effect as found using the classic Hamilton and Gifford (1976) paradigm. In order to test the hypotheses concerning the IC effect, it is necessary to compare the actor who appears less frequently, i.e. the minority actor (MinA) with the actor who appears more frequently, i.e. the majority actor (MajA) with regard to the infrequent or minority behaviour category (MinB). At the same time, the analogous comparison with regard to the majority behaviour category (MajB) serves as a control in the attribution task. As always, IC effects are measured in cell D compared to cell B. The comparison of cell C vs. A is mainly used as a control. That is, we could not attest to an IC effect if results for the control cells, i.e. for the majority behaviour category, are similar to the results for D vs. B (the comparison for the minority behaviour category).

For ease and clarity, instead of referring to cells in terms of the combination of actor and behaviour type, such as "majority actor, majority behaviour" (MajA, MajB), we will refer to them as cells A, B, C and D as presented in table 2.1. It is understood that a statement such as "the mean recall for cell D" refers to the mean recall of the stimuli associated with that cell. Since the cells had different amounts of stimuli, data were almost uniformly transformed into proportions with regard to expected values for a given cell or combination of cells. Finally, any statistic beyond a three-way interaction is not included here and is treated as error variance.

There are seven hypotheses that relate to the two measures commonly used in IC research (frequency estimation & attribution) and there are four hypotheses that relate to two other measures commonly used in memory research (recall and recognition, distinguishing between hits and errors or false alarms for both measures). For each of the hypotheses concerning IC effects, we will first present results from the frequency estimation and then from the attribution task.

Hypotheses that relate to frequency estimate and attribution measure

In the frequency estimation task, participants were given the total quantity of behaviours performed by each actor and then asked to write down the quantity of minority behaviours that were presented for each of them (i.e. cells B and D). Note that cells A and C cannot be used for the frequency estimation task since they are totally determined by the values in the two other cells. This task is said to solicit on-line cognitive processing (i.e. impressions that occurred at encoding).

A perfect score for this task (i.e. 100%) would mean that participants correctly estimated that cell D contained four behaviours and that cell B contained eight. Any score above 100% represents an overestimation. With regard to frequency overestimation, an IC effect is analogous to a biased impression that exaggerates the proportion of items that were in the minority category. The frequencies shown in table 3.1 below indicate that participants made significant overestimations for both cells D and B at T1 (154% & 152% respectively); $t(279) = 5.43$ $p < .0001$, $\eta^2 = 8\%$, two-tailed, ($SD_D = .544$), and $t(279) = 4.54$ $p < .0001$, $\eta^2 = 7\%$, two-tailed, ($SD_B = .58$). Participant's overestimation was even higher at T2 for cells D and B (159% & 155% respectively) $t(280) = 5.05$ $p < .0001$, $\eta^2 = 8\%$, two-tailed, ($SD_D = .49$), $t(280) = 6.25$ $p < .0001$, $\eta^2 = 11\%$, two-tailed, ($SD_B = .54$). As might be expected since results for D and B were similar, the differences between them at T1 and at T2 are not significant. The indication would be that participants generally overestimate the frequency of behaviour in the minority category regardless of the actor performing that behaviour. In summary, H1 is not confirmed when using frequency estimations to measure IC since participants' overestimations of minority behaviour, both in general and in specific groups, occurred for both minority and majority actors.

Table 3.1

Mean Percentage Scores and Standard Deviations for Each Cell for Frequency Estimates and Attribution Hits. All Participants Combined

	CELLS				
Time 1	A	B	C	D	M
Dependent Measure	% / SD	% / SD	% / SD	% / SD	
Freq est.		152/0.58		154/0.54	153
Attr. hits	81/0.17	75/0.25	73/0.23	80/0.23	77.25
Time 2					
Freq est.		155/0.54		159/0.49	157
Attr. hits	74/0.18	65/0.26	64/0.21	71/0.27	68.5

It should be noted that the attribution task, more so than the frequency estimation measure, is a faithful operationalization of the classical definition of illusory correlations. The attribution task requires participants to decide which actor performed each of the 36 behaviours that were presented in the original stimulus array. Whereas attribution hits represent a participant's correct responses, i.e. attributing the given behaviour to the correct actor, since this is a forced choice task, participants' errors in attributing behaviour in a given cell are by definition misattributions toward the other actor. An IC effect is shown by greater misattributions or false alarms in cell D since participants are making errors of commission by incorrectly associating the minority actor with salient minority behaviour that was in fact originally displayed by the majority actor. In addition, unlike the frequency estimation task, the attribution task is considered to be schema-driven, (i.e. memory-based). Results for this IC measure were quite different from those observed for frequency estimation.

Overall mean attribution hit scores show a significant decrease from T1 to T2 (77% vs. 69%; $t(280) = +8.463$ $p < .0001$, $\eta^2 = 20\%$, two-tailed). Important for showing an IC effect, participants' hit scores at T1 in cell B were significantly lower than in cell D (75% vs. 80%), $t(280) = -2.599$ $p = .01$, $\eta^2 = 2\%$, two-tailed, meaning there were significantly more misattributions to cell D than vice-versa. The same significant difference holds true at T2 where hits in cell B are 6% lower than in cell D (65% vs. 71%), $t(280) = -2.783$ $p = .006$, $\eta^2 = 2\%$, two-tailed. A significant difference in the opposite direction is seen at T1 and T2 when comparing cells C and A. The average attribution hit score is lower for cell C, meaning there were significantly more misattributions to the majority actor at T1, $t(280) = +5.975$, $p < .0001$, $\eta^2 = 11\%$, two-tailed, and at T2 $t(280) = +6.910$. $p < .0001$, $\eta^2 = 15\%$, two-tailed. The crucial result here is the significant inverse relationship for attribution hits when comparing cells B and D as opposed to comparing A and C, as seen in the two-way interaction between actor and behaviour ($F(1, 284) = 46.898$, $p < .0001$ $\eta^2 = 14\%$). These results clearly confirm the first hypothesis, i.e. there was an IC effect when using individuals as targets, just as previous research had shown for groups, and this effect occurs without giving participants any information as to the majority or minority status of the actors and without asking them to focus on one particular actor.

Following Pouliot & Cowen's (2000) findings, our second hypothesis (H2) predicted that IC effects would occur when using either visual or verbal stimuli. However, given the greater vividness and concreteness of photographs compared to sentences, we expected that IC effects would be somewhat diminished in this condition. Using the frequency estimation measure, we found a main effect for medium of presentation ($F(1, 284) = 13.287$, $p < .0001$, $\eta^2 = 4\%$). Combining data for T1 and T2, frequency estimation for verbal groups was 163% whereas it was

149% for the visual groups. Participants made overestimations for both media, but overestimations of minority behaviour were significantly greater for verbal presentations. No interactions were found between medium of presentation, actor and behaviour for this task.

Results on the attribution task showed a significant main effect for medium of presentation ($F(1, 284) = 71.580$, $p < .0001$, $\eta^2 = 20\%$). Overall, mean attribution hit scores in the verbal condition were lower (64%) than in the visual condition (76%). In fact, means for all individual cells show better performance in the visual condition when compared to the verbal condition, meaning that misattributions were generally lower when the presentation was visual. Thus, a participant's attribution scores depend on the medium in which the information about target persons is presented. Once again, a two-way interaction between actor and behaviour occurs, which indicates an IC effect (as shown for H1). Furthermore, there is a significant three-way interaction ($F(1, 284) = 7.403$, $p = .007$, $\eta^2 = 2\%$) because the degree of the two-way interaction depends on the medium. The two-way interaction is much more pronounced in the verbal medium. These relationships can be seen in Figure 3.1 below.

Further investigation (see Table 3.2 & 3.3) reveals that the media difference occurs primarily at T1 where the attribution hit means for verbal (66%) and visual (81%) are significantly different ($F(1, 284) = 10.410$, $p = .001$, $\eta^2 = 3\%$). This difference, although in the same direction, is no longer significant at T2 (ver. = 62%, vis. = 71%).

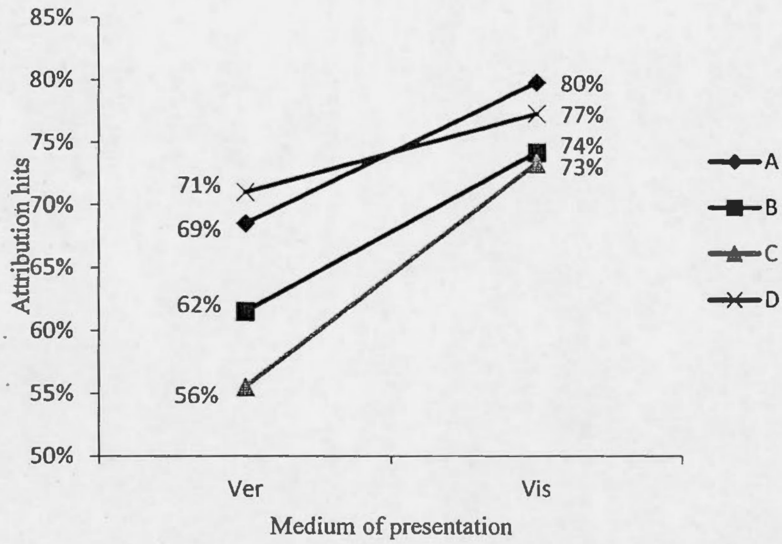

Figure 3.1 Three-way Interaction between Actor, Behaviour and Medium of Presentation for Attribution Hits

There is a significant IC effect in both media combining data for T1 and T2, as predicted. The strength of the visual medium, which produces generally higher attribution hit rates overall (i.e. less misattributions) seems to override the IC effect at T1. After a week the effect of time overrides the strong effect of the visual medium and an IC effect does emerge, i.e. cell D has more misattributions than cell B while cell A has more than cell C. Therefore, H2 is confirmed. Both media produce an IC effect overall, and this effect is stronger in the verbal condition than in the visual condition.

Table 3.2

Mean Percentages of Attribution Hits for Each Medium of Presentation

Cell:		A	B	C	D
T1	Ver / Vis (%)	70 / 85	65 / 79	57 / 79	73 / 82
T2	Ver / Vis (%)	67 / 77	36 / 51	55 / 67	68 / 72

Table 3.3

T-tests Comparing Proportion of Hits for Actors on Minority and Majority Behaviours for Each Medium and Time

Comparison	T1	T2
Ver A vs C	t (72) = 4.03 p < .0001, η^2 = 8%	t (72) = 3.47 p = .001, η^2 = 5%
Ver B vs D	t (72) = -2.20 p = .031, η^2 = 6%	t (72) = -4.99 p <.0001, η^2 = 1%
Vis A vs C	t (207)= 4.50, p< .0001, η^2 =9%	t (207)= 6.03 p< .0001, η^2 =15%
Vis B vs D	t (207) = -1.65, p = .101 NS	t (207)= -5.33, p<.0001, η^2 = 5%

Our third hypothesis (H3) predicted that an IC effects should occur in both the real-world salience condition (RwS) where cell D contains negative behaviour and in the experimental salience condition (ExS) where cell D contains positive behaviour. However, given the greater potency and impact of negative (as opposed to positive) salient information in RwS, we expected the IC effect to be larger in that condition than in the ExS condition.

For the frequency estimation measure, we found a main effect for salience type (F(1, 284) = 104.515, p < .0001, η^2 =27%) but in the direction opposite to our prediction. Mean frequency estimation scores combining T1 and T2 data in the RwS condition was 136% whereas it was 176% for the ExS condition.

When looking at mean attribution hit scores, we found a main effect for salience type (F(1, 284) = 28.617, p < .0001, η^2 = 9%). As predicted hit scores were lower in the ExS condition (66%) compared to the RwS condition (74%) which means that participants made significantly more misattributions in the ExS condition. Further investigation reveals significant differences between salience types occur at both T1 and T2. The difference between mean attribution hits for RwS (78%) and ExS (69%) at T1 is significant ($F(1, 284) = 5.564$, $p = .019$, $\eta^2 = 2\%$), and so is the difference between RwS (70%) and ExS (64%) at T2 ($F(1, 284) = 8.866$, $p < .003$, $\eta^2 = 3\%$).

Table 3.4 presents means at T1 and T2 for both types of salience. Paired sample *t*-tests compared cell B vs. D and cell A vs. C. Results indicate that there are no significant differences in the RwS condition, whereas both cell pairs showed significant differences in the ExS condition at both test times (see Table 3.5 for these results).

Table 3.4

Mean Percentage Scores of Attribution Hits for Each Salience Type at Each Test Time

Time		Cell: A	B	C	D
T1	RwS/ExS	77 / 84	85 / 68	74 / 73	85 / 76
T2	RwS/ExS	69 / 78	69 / 30	66 / 63	73 / 70

Table 3.5

T-tests for Attribution Hits Comparing Cell Pairs in the ExS Condition

Comparison	T1	T2
A vs C	$t\,(155) = 6.82$, $p < .0001$ $\eta^2 = 24\%$.	$t\,(155) = 7.45$. $p < .0001$ $\eta^2 = 27\%$.
B vs D	$t\,(155) = -3.11$, $p = .002$ $\eta^2 = 5\%$	$t\,(155) = -8.71$ $p < .0001$ $\eta^2 = 34\%$.

Once again, considering the two-way interaction between actor and behaviour and the significant differences between cell pairs in the ExS condition, we see that an IC effect is present here but not in the RwS condition, contrary to the prediction in H3 that an IC effect occurs for both conditions, as was found by Hamilton and Gifford (1976, experiments 1&2) for group targets. It would seem that when the targets are individuals, participants are only prone to the bias of an IC effect when minority behaviour is positive. This effect was multiplied sevenfold at T2. In effect, it is possible that the ExS condition, being the least common in nature, is the one that stands out most.

We also found a three-way interaction between salience type, actor and behaviour ($F(1, 284) = 12.209$, $p = .001$, $\eta^2 = 4\%$). Figure 3.2 presents attribution hits for RwS and ExS both times combined. Besides the main effect, we also found the inverse relationship when comparing the cell A and C pair to the cell B and D pair for each salience type. The general trend of a higher level of attributions hits for RwS seems constant except for cell A where a decrease in hits can be observed from ExS to RwS. The three-way interaction confirms that the ExS condition significantly increases the IC effect where misattributions are greater in cell D compared to B but inversely greater in A compared to C.

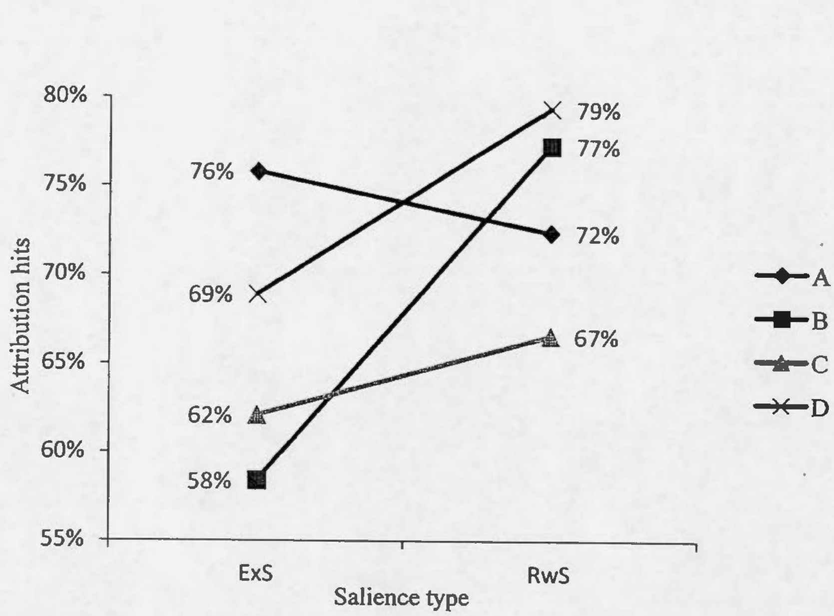

Figure 3.2 Three-way Interaction Between Actor, Behaviour and Salience Type for Attribution Hits.

Our fourth hypothesis H4 predicted that the IC effect should be stronger with an impression formation task than with the memory task. The premise was that with an explicit impression task, salient (i.e. minority) information should have a greater impact when there is an explicit request to form an impression and the target is not previously known. This hypothesis was not confirmed in either the frequency estimation task or the attribution task since there was no significant difference between the two conditions. It appears that the two task set conditions did not really differ that much from each other and that the distinct cognitive processing associated with each task was not so pure and simple, i.e. a bit of each process occurs in both cases. In addition to what they are instructed to do, participants in the memory task are also forming an impression and participants in the impression task are also remembering the information that is presented.

With regard to H5 concerning an increase in IC effects over time. Overall, each cell shows increased attribution errors at T2 compared to T1. However, the relationship at both times is that the greater proportion of misattributions are toward cell D from cell B and toward cell A from cell C, which accounts for the IC effect in both cases. The largest change is in cell B (30%), which supports H5. The changes over time in both media also support H5. Table 3.2 presents means at T1 and T2 for verbal and visual media. As can be seen, the IC effect occurs for the verbal condition at both T1 and T2, but it is much greater after a week's delay. Table 3.3 also presents the corresponding *t*-test results. In these tables, we can see that the largest difference between T1 and T2 occurs in cell B, which translates into misattributions toward cell D, and this occurs in both media. The finding of an IC effect in the visual condition at T2 after no effect was seen at T1 also supports H5. Another support for this hypothesis is seen in the ExS condition where the IC effect at T2 is much greater than at T1. It would therefore seem that after a week, there is a general increase of an existing IC effect and even the creation of an IC effect that did not exist in the first place.

Our sixth hypothesis H6 predicted that an interaction effect would occur between task set (impression vs. memory) and salience type RwS (when negative behaviour is salient) vs. ExS (when positive behaviour is salient). We had predicted that the combined effects of salient negative behaviour and an impression task would produce yet greater IC effects than either condition alone and certainly more than the opposite combination of salient positive behaviour and a memory task. As was found for the main effect for task, there were no higher order interactions with this variable and therefore there is no support for either H6 or H7, which predicted a three-way interaction between task, salience type and time of testing.

<u>Hypotheses that relate to recall and recognition measures</u>

Recall and recognition measures are the staples of memory research. However, they are not usually found in IC research. As previously stated, we included these measures because they truly complement IC research and contribute to a more thorough understanding of the phenomenon. As we can see in table 3.6, *recall hits,* which represent the number of correct responses freely recalled by participants. A hit on this measure means that behaviour and actor were correctly identified.

Recall error is a measure of false alarms. It combines the wrong answers (i.e. misidentifying the actor) with the ones that were invented. For recognition, participants had to determine for each of 32 actor – behaviour combinations (four from each cell and four foils for each cell), whether they had seen or read the information in the original presentation. Before looking at the data for the last four hypotheses concerning memory effects associated with different independent variables, we will look at the overall results as presented in Table 3.6 below.

Table 3.6

Mean Percentage Scores and Standard Deviations for Each Cell for Each Dependent Memory Measure Combining All Participants

	CELLS				
Time 1	A	B	C	D	M
Dependent Measure	% / SD	% / SD	% / SD	% / SD	
Recall hits	35/0.16	33/0.20	38/0.21	42/0.25	37
Recall Errors	4.6/0.08	6.3/0.12	7.5/0.13	7.0/0.17	6.3
Recog hits	87/0.07	87/0.96	74/1.18	85/0.94	83
Recog FA	14/0.67	14/0.84	12/1.04	16/0.89	14
Time 2					
Recall hits	26/0.16	24/0.19	29/0.20	35/0.25	28
Recall Errors	5.1/0.09	7.3/0.14	8.5/0.12	11.5/0.25	8.1
Recog hits	81/1.10	84/1.13	72/1.12	78/1.17	78
Recog FA	35/1.11	31/1.23	33/1.29	35/1.18	34

Despite all experimental controls, T2 is not 100% identical to T1 when comparing recall or recognition rates. The context of memory testing at T1 and T2 are different (aside from the delay of one week) in that at T2 participants had additional familiarization with the 36 stimuli because the attribution task at T1 occurs after they had responded to the recall and recognition tasks at T1. This additional exposure to the 36 stimuli before T2 testing could make recall and recognition scores at T2 better than they would have been otherwise. In that sense, if there are significant differences between memory at T1 and T2, they would tend to be an underestimate of the effect of the passage of time and finding significant differences would be more difficult.

Using McNemar's test, as can be seen in Table 3.6, there is a nine percent reduction in recall hits from T1 (37%) to T2 (28%). This difference is significant $t(279) = +9.13$. $p < .0001$, $\eta^2 = 23\%$, two-tailed ($SD_{T1} = .16$; $SD_{T2} = .15$). Looking at the individual cells for this task, we can see that at T1, participants were better at recalling behaviour for cell D than for cell B (42% vs. 35% respectively). This difference is significant, $t(279) = -5.65$. $p < .0001$, $\eta^2 = 6\%$, two-tailed; ($SD_D = .25$; $SD_B = .20$). This difference is also significant at T2 where recall for cell D is 35% whereas it is 24% for cell B, $t(279) = -7.04$. $p < .0001$, $\eta^2 = 15\%$, two-tailed ($SD_D = .25$; $SD_2 = .19$). The three percent difference between cells C and A (38% vs. 35%, respectively) at T1 is also significant, $t(279) = -2.88$ $p = .01$, $\eta^2 = 3\%$, two-tailed, ($SD_C = .21$; $SD_A = .16$). Likewise, this difference at T2 was also found to be significant, $t(279) = -2.39$ $p = .02$, $\eta^2 = 1\%$, two-tailed ($SD_C = .20$; $SD_A = .16$). The percentage of recall hits for cell D is the highest of the four cells at both times. Thus, recall for the combination minority actor, minority behaviour was proportionally greater than for any other cell. However, since the results for both cell pairs (D vs. B & C vs. A) show significant differences in the same direction the data on recall does not follow the pattern that is normally seen when there is an IC effect. This raises the question as to the role of memory in producing the effect.

Mean recall errors significantly increased over time, $t(279) = -2.55$ $p = .011$, $\eta^2 = 2\%$, two-tailed. At T1, recall error was 6.32% ($SD_{T1} = .59$) whereas it was 8.10% at T2 ($SD_{T2} = .06$). The small difference in percentage recall error between cell D and cell B at T1 (6.93 % vs. 6.25% resp.) was not significant but the difference between these cells at T2 was significant (11.50% vs. 7.30% respectively), $t(279) = -3.51$. $p = .001$, $\eta^2 = 5\%$, two-tailed, ($SD_D = .25$; $SD_B = .14$). The difference in recall error at T1 for cell C vs. A (7.53% vs. 4.56% resp.) was significant $t(279) = -4.34$ $p < .0001$, $\eta^2 = 5\%$, two-tailed ($SD_C = .13$; $SD_A = .08$). The difference at T2 for cell C vs. A (8.54% vs. 5.09% resp.) was still significant, $t(279) = -5.47$ $p < .0001$, $\eta^2 = 10\%$, two-tailed ($SD_C = .12$; $SD_A = .09$). Therefore, errors for the minority actor were always greater regardless of the type of behaviour, which does not follow the pattern seen when there is an IC effect.

General results presented in Table 3.6 show that recognition hits significantly decrease by 5% from T1 to T2 (83% vs. 78%); $t(255) =+3.274$. $p = .001$, $\eta^2 = 3\%$, two-tailed ($SD_{T1} = 0.713$; $SD_{T2} = 0.769$). There is no significant difference between cells B and D at T1 for this measure (87% vs. 85% respectively), but at T2 cell B (84%) is significantly higher than cell D (78%), $t(280) = +3.289$ $p = .001$, $\eta^2 = 3\%$, two-tailed, ($SD_D = 1.17$; $SD_B = 1.134$). However, there is also a significant difference in the same direction between recognition in cell A (87%) and cell C (74%) at T1 $t(279) = +7.277$ $p < .0001$, $\eta^2 = 15\%$, two-tailed, ($SD_C = 1.175$; $SD_A = 1.070$) and at T2 where recognition in cell A (81%) was again greater than in cell C (72%), $t(279) = +4.246$ $p < .0001$, $\eta^2 = 5\%$, two-tailed, ($SD_C = 1.116$; $SD_A = 1.095$). In general, recognition was better for the majority actor regardless of behaviour. Therefore, at neither T1 nor T2 do we see the pattern that normally appears when there is an IC effect.

False alarms rates on the recognition task show an overall significant 20% increase from T1 to T2 ($SD_{T1} = 0.51$; $SD_{T2} = 0.88$), $t(291) = +14.435$. $p < .0001$, $\eta^2 = 40\%$, two-tailed. There are no significant differences at T1 between cells D and B (16% vs. 14% resp.), but there is at T2 (35% vs. 31% resp.), $t(279) = +2.19$

$p = .029$, $\eta^2 = 1\%$, two-tailed ($SD_D = 1.18$; $SD_B = 1.23$). In contrast, the two percent difference for cell C and A at T1and at T2 were not significant.

Our eighth hypothesis H8 predicted that participants would be better at detecting false alarms in the visual condition for both recall and recognition. Differences between T1 and T2 for verbal and visual presentations were significant in cell B, C and D (B: $\chi^2 = 5.634$ (1,208) $p = .018$, $\eta^2 = 3\%$), (C: $\chi^2 = 9.446$ (1,208) $p =.002$, $\eta^2 = 5\%$), (D: $\chi^2 = 9.121$ (1,208) p =.003, $\eta^2 = 5\%$). In general, there was a significantly lower false alarm rate in the visual condition compared to the verbal condition. We found no significant differences between the usual cell pairs (A vs. C & B vs. D) in the verbal medium at either T1 or T2. In the visual condition, where false alarm rates were lowest, there was a significantly higher false alarm rate in cell B compared to cell D at T1 ($\chi^2 = 6.22$ (1, 208), $p = .013$, $\eta^2 = 3\%$), as well as at T2 ($\chi^2 = 5.634$ (1,208) $p = .018$, $\eta^2 = 3\%$). No such differences were found between cells A and C. A main effect was found for behaviour in the visual condition (MajB = .47 MinB = .36, $Z = 2.10$, p = .036, $\eta^2 =2$ %). Essentially, this is almost the opposite of the pattern that is seen when there is an IC effect.

Further analyses reveal that significant time differences occurred in the verbal condition. All four cells show a difference from T1 to T2: (**A**: $\chi^2 = 6.88$ (1,81) $p = .009$ $\eta^2 = 9\%$; **B**: $\chi^2 = 6.32$ (1,81) $p = .012$ $\eta^2 = 7\%$; **C**: $\chi^2 = 4.23$ (1,81) $p = .040$ $\eta^2 = 5\%$ and **D**: $\chi^2 = 21.79$ (1,81) $p < .0001$ $\eta^2 = 27\%$). The greater difference is for cell D. These effects were not found in the visual condition, with cell D showing the greatest difference. It would also appear that the false alarm rate increases for cell D with visual media whereas they decrease in the verbal media.

As presented in table 3.7 participants consistently made fewer errors for cell D than for any other cell and this for both media. Interesting to note that errors from T1 to T2 in cell D almost doubled in the visual condition.

Table 3.7

Mean Proportions for Recall Errors by Medium of Presentation

	Media	CELL			
Time		A	B	C	D
T1	Ver / Vis	62 / 30	52 / 23	63 / 29	40 / 13
T2	Ver / Vis	62 / 37	55 / 33	49 / 43	48 / 25

Table 3.8 presents the means for recognition error by medium of presentation at T1 and T2. As we can observe, false alarm scores in the verbal condition go down from cells A to C and from B to D at both times. We found two significant differences: Cell B (3.5%) vs. D (1.1%) at T1, ($\chi^2 = 9.82$ (1,81) $p = .002$ $\eta^2 =$ 12%), which suggests an IC effect for T1. The other significant effect was for cell A (6.5%) vs. C (4.6%) at T2, ($\chi^2 = 9.76$ (1,81) $p = .002$, $\eta^2 = 12\%$). As for the visual condition, means go down from cells A to C at both times but the false alarm rate increases from cell B to D, suggesting an interaction effect. Results indicate that the difference between cells A and C at T1 differed significantly: $\chi^2 =$ 8.43 (1,211) $p = .004$, $\eta^2 = 33\%$). Hence, in the verbal condition we see an IC effect at T1, but not at T2. No IC effects are detected in the visual condition.

Table 3.8

Means Proportions for Recognition Errors (FA) by Medium of Presentation

	Media	Cell			
Time		A	B	C	D
T1	Ver / Vis	43 / 47	35/ 38	28 / 34	11 / 45
T2	Ver / Vis	65 / 40	53 / 39	46 / 39	52 / 46

The ninth hypothesis H9 concerned differences in memory due to the type of salience. Table 3.9 presents mean percentage recall scores for each cell in both salience conditions. A *t*-test reveals that the only significant difference exists between cells A (44%) and C (48%) for the RwS condition at T2 ($t(124) = -2.115$ $p = .036$, $\eta^2 = 3\%$). The higher recall hit rate in cell D compared to B is not significant. As for the ExS condition, cells B and D are significantly different from each other at both times. T1 ($t(155) = -3.481$, $p = .001$ $\eta^2 = 7\%$), T2 ($t(155) = -5.193$, $p < .0001$, $\eta^2 = 5\%$), whereas cells A and C are not different from each other at T1 and T2.

Table 3.9

Mean Percentage of Recall Hits for Each Salience Type at Each Test Time

	Salience	Cell			
Time		A	B	C	D
T1	RwS/ ExS	53 / 62	59 / 51	56 / 60	62 / 59
T2	RwS / ExS	44 / 51	53 / 35	48 / 48	48 / 42

Hence, it would appear that just as the ExS condition seemed more favourable than RwS in creating an IC effect, the memory data on recall hits generally repeats that pattern, which might suggest that memory plays a role in IC. However, if we look more closely at the data we see first that the pattern of D >B and C >A for recall only corresponds to the ExS condition. In RwS, the pattern was like this for attribution hits, but now with recall it is not like that at all. Secondly, recall is generally a little better for RwS, especially for cell D which has a mean of 55 in RwS but only 50.5 in ExS. Although the difference in recall is significant when comparing D vs. B in ExS, the best recall is always in cells A and C for either condition. Therefore, the significant difference between D and B is really due to the poor recall in cell B for ExS at both T1 and T2.

We found a three-way interaction (fig. 3.3) between salience type, actor and behaviour $F(1, 273) = 21.866, p < .0001, \eta^2 = 7\%$). This occurs because there is a two-way interaction between behaviour and actor in the ExS condition but not in the RwS condition. Therefore, only the ExS condition has a pattern of recall that resembles the pattern found when there is an IC effect, i.e. the inverse relationship between cell pairs: recall is greater in cell A than cell C, but greater in cell D compared to cell B. It seems that the special properties of cell D depend on the qualitative nature of the salience. The atypical salience in the ExS condition promotes memory for stimuli in cell D (the good behaviour performed by a generally bad person), but this does not occur when the minority behaviour is what is normally found in the real world, i.e. that bad behaviour is sometimes found among otherwise good people.

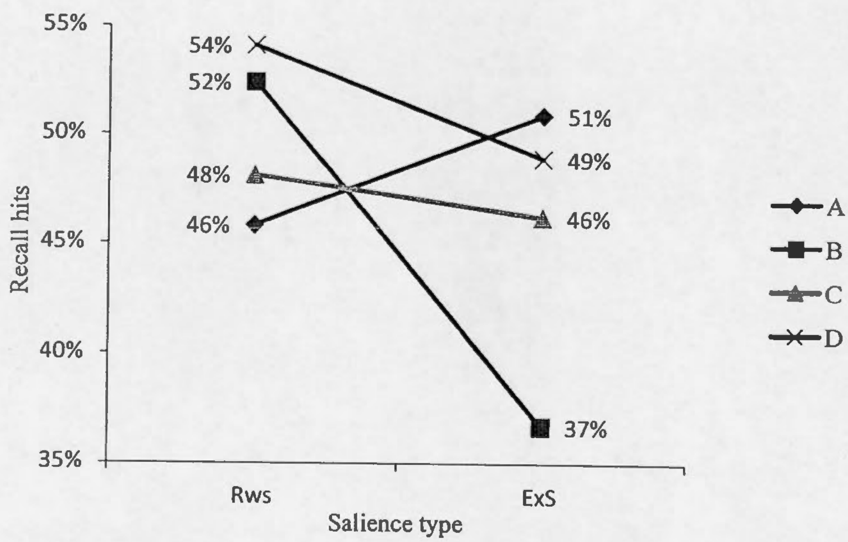

Figure 3.3 Three-Way Interaction Between Actor, Behaviour and Salience Type for Recall Hits.

The ninth hypothesis also predicted that there would be higher recognition rates in cell D (especially compared to cell B) in the real world salience condition (RwS) compared to the experimental salience condition (ExS). As seen in Table 3.10 results show that in both salience conditions, the proportion of participants with high recognition scores in cell D is lower compared to cell B. In addition, this is much more pronounced in the RwS condition where the difference is significant for both times (T1: $\chi^2 = 7.52$ (1,129) $p = .006$, $\eta^2 = 6\%$; T2: $\chi^2 = 9.49$ (1,129) $p = .002$, $\eta^2 = 8\%$). This does not follow the prediction. There were also significant differences in the ExS condition but only for cells A vs. C, (T1: $\chi^2 = 58.06$ (1,163) $p < .0001$, $\eta^2 = 36\%$; T2: $\chi^2 = 48.08$ (1,163) $p < .0001$ $\eta^2 = 29\%$). At the same time, there is no inverse relation in either condition when cell C is compared to A at both T1 and T2. Therefore, overall this recognition pattern does not correspond to what is seen when there is an IC effect.

In addition, recognition scores for cell A and B are highest in both conditions at both times showing that participants are better at recognizing majority behaviour regardless of the actor. These findings do not support the prediction of a higher recognition rate in cell D. The proportion of participants who have higher recognition scores is significantly greater in the ExS condition for all cells except cell A when compared to the RwS condition. This does not support H9.

Table 3.10

Mean Percentage for Recognition Hits by Salience Type by Time

	Salience	Cell			
Time		A	B	C	D
T1	RwS / ExS	75 / 71	75 / 56	63 / 28	60 / 50
T2	RwS / ExS	51 / 56	66 / 48	50 / 20	48 / 44

False alarms (table 3.11) were predicted to show the same pattern as recognition hits. The proportion of participants scoring above the expected median in cell D is generally higher than the proportion in cell B in the RwS condition while the reverse relation holds when comparing cell C to A in this condition. This is the typical IC pattern of higher false alarm rates for cell D at T1 and T2 while the opposite relation holds for cell C vs. A. This does not occur in the ExS condition where false alarm rates are always higher for the majority actor. In this sense, H9 is confirmed when looking at false alarm data. With regard to cell D alone, the ExS condition has a significantly higher proportion of participants with higher rates of false alarms compared to the RwS condition at T1 ($Z = -5.11$ $p < .000$, $\eta^2 = 9\%$). This is contrary to the prediction that RwS would produce a higher rate of errors in cell D and even though this difference no longer appears at T2, the hypothesis is not confirmed.

Table 3.11

Mean Proportions for Recognition Error (False Alarms) by Salience Type by Time

Time	Salience	Cell A	B	C	D
T1	RwS / ExS	47 / 46	14 / 56	36 / 29	20 / 47
T2	RwS / ExS	45 / 49	26 / 57	44 / 39	42 / 52

Our tenth hypotheses H10 predicted that recall would be better in the impression task than it would be for the memory task. As found earlier when examining IC effects, we did not find any significant differences between impression and memory with regard to recall hits. This hypothesis also predicted that recall error rates (i.e. false alarms) would be greater in cell D, which is exactly what was found. Recall errors represent incorrect identification of the actor performing the behaviour, which is analogous to a misattribution.

Our eleventh hypothesis H11 stipulated that the decrease in recall would be greater than the decrease in recognition. Looking back at Table 3.6, we can see that means for recall decrease from T1 (37%) to T2 (28%). This is a proportional decrease of 24.3%. As we have previously seen, this nine percent drop is significant. There is also a significant five percent decrease in recognition between T1 (83%) and T2 (78%), $t(255) = +3.27$. $p = .001$, $\eta^2 = 3\%$, two-tailed ($SD_{T1} = 0.71$; $SD_{T2} = 0.77$). The proportional decrease in this case, however is only 6%. The 4% difference between the decrease in recall and decrease in recognition is in the predicted direction, but the difference is not significant. However, when considering that recognition hits was significantly higher than recall hits at both T1 and T2, it is more important to consider the relative decreases, which were clearly greater for recall. The overall data show that recall was much harder than recognition. We also expected these differences over time to be greater for non-salient stimuli (i.e. cells A, B, and C), which was not the case. The hypothesis also predicted that cell D hit rates would be proportionally higher at T2 when compared with T1. Recall and recognition scores do not reflect that prediction. Finally, we also predicted that false alarm rates would be higher at T2, which is exactly what we found. False alarm rates for cell D at T2 (35%) are almost doubled, compared to false alarm rates at T1 (16%). This represents an increase of 118% and the difference is significant ($Z = 5.39$, $p =$, 0001, $\eta^2 = 10\%$). Likewise, as mentioned earlier, overall misattributions toward cell D were higher at T2 (31%) than at T1 (23%), however the same was true for misattributions to cell B although at a lower rate (T2 = 29%, T1 = 20%).

CHAPTER IV

DISCUSSION

Our first objective aimed at extending the IC effect to individual targets. This is supported. Overall, we find a clear IC effect for the attribution measure (looking at misattributions toward cell D). There is also a clear overestimation of cell D behaviour, but we also found this overestimation for cell B, which indicates that cell D is not unique in this respect. The nature of the task is such that we only get data on minority behaviours for each actor. Having no measure for the majority behaviour does not permit us to determine the extent of biased perceptions for that category, i.e. exaggerated estimates regarding the majority categories for both actors.

There is a big difference between the nature of the frequency estimation task and the attribution task even though both aim at measuring the same effect. In fact the frequency estimation task, which may be a reasonable sociological question when the target is a group of people (how many members of this group show bad/good behaviour?), is a little odd when referring to individuals because we don't normally think of people in terms of the proportion of their behaviours that are good or bad. Furthermore, the frequency estimate is a global measure and not necessarily based on memory at all, just as global impressions do not necessarily coincide with the recall of the behaviours or traits upon which the impression is based (Srull & Wyer, 1980).

Therefore, our present findings do extend what was previously found for groups and inanimate objects when using the classic IC paradigm developed by Hamilton and Gifford (1976), except for the fact that there are also overestimations of minority behaviour for majority actor (cell B). Again, this suggests that a difference exists between the perception of individuals and groups and categories of objects. The latter are more arbitrary and the links between individual stimuli (group members or objects) are not perceived to be causally connected in the way that an individual's behaviours are connected. People assume that an individual's actions are tied together by his personality traits. However, there is no similar notion to explain the behaviours that have nothing to do with group membership even though the individuals all belong to the same group. In addition, impression formation is naturally triggered by perceiving another person, whereas an analogous evaluative process may not occur when receiving information about various individuals or objects that are identified as members of an anonymous abstract group. Therefore, participants' are likely forming impressions of both targets in all conditions. This may account for our lack of significant findings between the impression and memory task set.

When participants judge the larger majority group as in Hamilton and Gifford's (1976) research, or the larger group of objects as in Pouliot and Cowen's (2000) research, these collections of diverse persons or objects would not have much cohesion. In contrast, no matter how many behaviours of an individual one might observe, whether that number is relatively large or small, i.e. majority or minority, the perceiver assumes they are connected when they depict the same individual target. Therefore, the same bias seen in global judgments or overestimations occurs for both targets. However, when using the more precise attribution task, which is a cued recall task that involves 36 responses, there is a much better chance of detecting differences between errors in cells B and D and of comparing that to errors in A and C. By its very nature, the attribution task is more comprehensive and more sensitive than the frequency estimation task and it directly calls up memory processes whereas the frequency estimation task does not. With this more precise task, our first objective is upheld.

Our second objective was to better determine the role of memory in producing the IC effect. When we look at free recall data, we see that it is always better for the minority actor regardless of whether the behaviour was more or less frequently observed (maj. Beh. Vs. min Beh.). Even though recall was indeed best for cell D (vs. B), the fact that it is also higher for cell C (vs. A) in our control comparison does not support the idea that the IC effect is based on better recall of the most salient information in the array (i.e. cell D). A similar pattern was found for recall errors, i.e. errors of commission, in which cell D again was not unique because cell C also had greater errors than cell A at both T1 and T2. Once more, it is not the doubly salient properties of cell D that seem to account for the IC findings. However, the salience of the minority actor, of which half as many behaviours are presented, does possibly play a role in producing the greater rate of hits in cell D and errors of commission in cell C.

Results for recognition hits present the reverse relationship. The majority actor has the highest rate of hits. However, when looking at false alarms, which are directly measured by this task, we can see a pattern that resembles an IC effect at both T1 and T2, since errors are greater for cell D than for cell B. In contrast, there is no significant difference between cells C and A at T1 and at T2 cell A has more errors than cell C. Thus, only false alarm rates show the pattern that would be expected for cell D if it were in fact unique. On the other hand, the attribution data clearly shows a significant bias toward cell D in particular. Consequently, the only time there was a significant result for memory was when using false alarm data, which is the memory measure that most closely resembles the misattributions seen in the attribution task. In conclusion, misidentification (false alarms on the recognition test) and misattributions (errors on the attribution task) are the measures that most clearly validate something about the role of memory and the IC effect. Ironically, it is not the presence of better memory due to salience; it is false memories that make cell D unique. At the same time, recognition hit rates are higher for the majority actor regardless of the behaviour category, as was found by Pouliot & Cowen (2000).

As we have seen, the reverse pattern occurs for recall hits, which is closer to what we expected. However, given that salience does not seem to play a role with other memory measures, what we found may not be due entirely to the salience of the minority actor but may in part be because recall is a more difficult task.

Because of the difficulty, there would be a greater impact on memory for the majority actor since there are twice as many items to be retained. Participants may have a limit to the number of paired associations (actor and behaviour) that they can retain and because the number of paired stimuli is doubled for the majority actor, it may render the recall task much more challenging for his behaviour. Although previous IC research found no effect of cognitive load on recognition, a recall task has never been used in the past and so the influence of cognitive load on recall has never been previously determined. It is likely that because the recall task is more challenging, a given level of cognitive load (i.e. the rate of presenting the 36 stimuli) has a negative impact on recall whereas it does not affect recognition performance. Not only is recognition an easier cognitive task in general, in our particular test there were an equal number of items representing each cell and each actor. Therefore, the easier task combined with equivalent representations from each cell may have also contributed to a reduction of the impact of salience on responses. There is also the possibility that it was easier to correctly identify the hits for the majority actor by guessing since it is more likely that a schema for cell A (or B) would have developed due to receiving twice as much information about the majority actor in the initial stimulus array (as was explained by Pouliot & Cowen, 2000).

Our third objective was to determine if time had an effect on illusory correlations. Our findings show that the IC effect grew stronger with time. The increase was seen overall and in specific conditions. We even found that an IC effect could occur at T2 when none was measured at T1, in particular for the visual medium and for false alarms in general. If IC effects were linked to false alarms and misattributions in cell D, it would suggest that false memories could increase over time due to the bias triggered by the IC effect. Even the less sensitive measure of frequency estimation showed an increased bias toward overestimation at T2 compared to T1, although this was true for both actors, not just the minority. Research on memory demonstrates that performance is reduced with the passage of time. In conjunction with this general rule, our research demonstrates that a reduction in performance can be linked to augmentation and even creation of the IC phenomenon. These results would suggest that ICs are linked to making errors or to forgetting rather than to better retention of salient information.

Our fourth objective was to determine if media would have an effect on illusory correlations. As expected, the presentation of visual stimuli significantly improves memory performance compared with presentation of verbal stimuli. Hit rates are higher and error rates are lower in visual groups. Nonetheless, the combined data for T1 and T2 shows an IC effect for both media, but as stated earlier this really only emerges at T2 for the visual medium. However, the effect is stronger for verbal presentations as seen in the significant three-way interaction between medium, actor and behaviour. As stated in the results section, the strength of the visual medium, which produces significantly higher attribution hit rates overall (i.e. less misattributions) seems to override the IC effect at T1, but after a week, the effect of time overrides the strong effect of the visual medium and an IC effect does emerge.

The fifth objective was to determine what role salience (RwS, ExS) plays in IC effects. It is interesting that we found an IC effect for ExS but not RwS. It might have to do with the expectations that one may have about individuals, as opposed to groups or inanimate objects. The ExS condition possibly helped characterize the actor as a generally negative person. This would make him distinct in a society where people are generally good. Therefore, participants would not only be influenced by the salience of a negative person, they would also be influenced by the salience of positive behaviour due to its infrequency. This effect was seen by Pouliot & Cowen (2000) in their memory test, where errors tended to be biased toward the more frequent category. Thus, the effects of cell A could combine with those of cell D to produce larger illusory correlation. This effect would not be prominent when making frequency estimations. Following this line of thought, the IC effect in the ExS condition may be due in part to the combined influence of negative valence and high frequency in cell A, not just to salience of items in cell D.

Based on our findings, we can assert that salience has an effect on ICs, but the manipulation by which the valence of salient information is reversed needs more attention in research since this study is the first after Hamilton and Gifford (1976, exp. 2) to attempt a replication with a similar paradigm. Otherwise, a possible explanation for the fact that we did not find the IC effect for RwS lies in the fact that even though we found general trends for higher cell D hit rates in attribution, recognition, recall errors and false alarm measures, these trends did not make it to the significant level. However, RwS did show a significant effect in the recall and in the recognition hit measures. All in all, this combination of results for RwS does offer some support to the notion that salience plays a role. However, the fact that ExS produces significantly more of an effect suggests again that the striking quality of a fundamentally bad person is not equivalent to a group in which the majority of a random selection of members behaves badly as individuals outside the group, especially for an anonymous group that has no defining characteristics of its own.

Our sixth objective aimed at determining if task set (Imp vs. Mem) would influence illusory correlations. Our impression and memory task were designed to create different cognitive orientations, which would in turn influence the way information would be processed. Following McConnell, Sherman & Hamilton (1994), the impression task was designed to promote on-line processing whereas the memory task was designed to promote memory-based processing. As previously mentioned Sanbonmatsu, Sherman and Hamilton, (1987) had hypothesized that on-line processing was responsible for them not finding the IC effect for individual targets. At the same time, Pouliot and Cowen (2000) suggested that the IC effect might not have been memory-based.

There were no significant differences between impression formation and memory tasks. Nonetheless, we must consider that participants were given the impression or memory consolidation tasks (while the 36 stimuli were presented) as a preamble to the other tasks (i.e. the dependent measures) and that IC effects were indeed found in the attribution task, which is considered a memory-based task but not for frequency estimation, which is more of an impression task.

Therefore, it is reasonable to assume that both impression and memory processes are activated simultaneously when processing information about individuals and that these processes are not mutually exclusive. In the current study, using the classic IC paradigm, the orientation task (during consolidation) was not sufficient to override the influence of the other type of processing. It is also possible that because participants must process information about two target individuals, they form impressions regardless of the consolidation task, because they are not only judging each piece of data as received, they also must compare and distinguish between the two actors as they receive more and more stimuli (and as already mentioned, the task of memorization may be particularly challenging). At the same time, to the extent that frequency estimation is the result of an on-line process of global impression formation, it does not appear that this process is more prominent for one actor as opposed to the other since overestimations linked to inconsistent salient information occur in both cases.

Alternatively, we could propose that ICs may not even be related to cognitive mechanisms (instrument, machine, method) but are instead related to a cognitive structure (arrangement, organisation, and configuration). As such, the IC phenomenon could be a form of schema through which information (data) is processed. Its structure would not depend on any particular mechanism. Rather, it could be a filter through which information passes on its way to being encoded or retrieved. Defining the IC phenomenon as a structure could return to a connectionist framework for person memory where nodes are influenced by the neighbouring ones. The IC effect would occur by biasing or weighing information as it passes through the different nodes. This idea has features in common with the line of thought developed by McConnell, Sherman and Hamilton (1994). They suggested that a post-encoding process could be involved in the formation of illusory correlations. That is, classification or judgments about target stimuli change because of other target stimuli that are subsequently introduced, to which we would add that each additional stimulus would also be filtered, i.e. weighed or biased by connected information already in memory. Our findings in the attribution task seem to corroborate these two theories since time was shown to have an effect on the IC phenomenon. In essence, finding a stronger effect at T2, compared to T1, or finding an effect at T2 when none existed at T1, demonstrates that information does not remain static in memory. As such, we could consider that prior information influences the encoding of new information and that new information influences the re-coding of older information.

Other considerations

Our attribution and frequency estimation tasks aimed to solicit different cognitive mechanisms. As such, the attribution task is similar to cued recall where specific data is used to prompt memory. On the other hand, the frequency estimation task is considered to solicit a global approach to judgment (Tversky and Kahneman, 1973)

This global approach to judgment of information may explain the results we found for the frequency estimation task. Participants may have overestimated both cell B and cell D behaviour by first responding to the ease with which it comes to mind due to the quantity of stimuli presented in cell B, and second, by responding to the saliency of cell D behaviour. It is not impossible that sheer quantity of majority behaviour and salience of minority behaviour may have thus acted simultaneously in this task. Furthermore, salience and incongruity (Schmidt, 1991) of ExS behaviour may have had participants overestimate, to an even larger degree, both frequencies in that condition. The current results suggest there are indeed different cognitive functions associated with the two IC tasks although both present similarities since neither promotes extensive search in memory. There is a somewhat analogous difference between the effects of verbal and visual media, in that the two media are also said to solicit different cognitive mechanisms (Paivio, 1971, in S. Fiske & S. Taylor, 1991). The present study confirmed the superiority of visual over verbal.

Limitations and future research

One possible limitation of the current study is related to the procedures necessary for having adequate controls during the testing phase so that dependent measures in all conditions could be directly compared, even though half the participants read the info about the targets while the other half saw the info about the targets. In addition, it was considered more realistic to ask verbal questions about what was seen since in daily life one is rarely asked if a photo or picture represents something one has witnessed in the past. Nevertheless, in eyewitness testimony, the use of "mug shots", surveillance videos or line-ups are typical testing procedures that tap visual memory (although they can obviously also solicit false visual memories or biases such as ICs). On the other hand, we must not forget that even in eyewitness testimony, the probability of having actual pictures of a person engaged in good or bad behaviour is not very likely.

In the visual condition of the present study, participants were given questionnaires that used words to describe the pictures. In essence, they were asked to convert visual stimuli into semantic equivalents; a step that participants in the verbal condition did not have to go through. Future research using the visual condition could use questionnaires that included small photographs instead of words on the attribution and recognition tests. This could possibly eliminate the cognitive step needed to convert visual information into semantic information and allow researchers to see to what extent the process of translation influences results in visual groups. Considering that in the present study the visual condition produced a significantly weaker IC effect, if this translation between mental representations has any effect it would appear to be one of attenuation of IC effects. Perhaps the influence of the filter or of post encoding, is reduced by the need to go from visual to verbal. It would be interesting to see if the IC effect is stronger or yet further reduced when no translation to a verbal representation is necessary. This procedure only applies to the attribution and recognition tasks since neither verbal nor visual information depicting or describing the original 36 stimuli are presented in free recall or frequency estimation tasks.

Using visual test material could be accomplished if each student/participant is equipped with a computer and where a program could replace the hard copy of the questionnaire. Furthermore, this method of testing would make additional data available to the researcher. Particularly, this could permit gathering data on response times that is known to be a sensitive measure and that might detect subtle differences in our eight conditions. Computer data could also make it easier to determine if there are primacy or recency effects and compare recall of common vs. uncommon behaviours, etc.

A possibility for the results found for impression and memory lies in the manner in which the variable was operationalized. We had participants either write down key words for the memory condition, or write down the valence (pos-neg) of the behaviour being presented for the impression condition. In retrospect, it is impossible for us to surmise that participants in the impression formation condition did not commit specific information to memory. Likewise, participants in the memory condition could have formed impressions of the stimuli being presented. Therefore, the intended specificity of each task may not have followed through in the actual processing of the stimuli. As a post-script, we may have had more success in differentiating impression and memory by using a comprehension task (see McConnell, Sherman & Hamilton, 1994)

Our experimental manipulation for creating an impression and a memory condition seems insufficient for its intent. On the attribution task, which is a kind of memory task rather than an impression task, participants are implicitly pushed to search for the answer in memory. Of course, if they do not find the answer after searching memory, they can guess an answer based on their "global" impression. However, the attribution task in a sense can override the orientation given by the impression consolidation task. This would make the two task set groups perform similarly because 1) both processes can occur in both conditions and 2) the attribution task directs them to search memory regardless of how the consolidation task oriented them during reception of info.

Similarly, although the memory task set orients participants to memorize rather than form an impression along the way, the natural process that is induced when seeing/reading information about another person is to form an impression. Impression formation is a fundamentally adaptive and efficient process needed to determine if other people are friend or foe, good or bad, i.e. it is a basic process necessary for survival in the social world. Memorizing specific behaviours is not an automatic or necessarily adaptive or efficient process. In addition, people typically do not attempt to retrieve specific data on another person to determine how to respond to or judge that other person. Therefore, the frequency estimation task may invite people to recall what they specifically saw or read, but as we have seen, recall is much harder than cued recall or recognition. Furthermore, the frequency estimation task would require an extremely difficult memory task if memory was at all involved. Participants would have to search for specific stimuli with no cues to guide them as on the attribution task or the recognition task. Then, once these stimuli were retrieved from memory, participants would have to retain them simultaneously in consciousness and then count how many of them they were able to retrieve. Such a process, if at all possible, would be extremely hard and full of errors.

Hence, we could suggest that future research should not pursue comparisons of task sets/instructional sets as done here, in part because it is impossible to stop participants from forming impressions or recalling information, depending upon what the response requirements are on a given dependent measure. It any event, it may be wiser to do away with the consolidation task, as done here, and concentrate on having every group perform a small task orienting them toward global impressions, e.g. likeability rating, writing a few key words on their impressions of the two targets. We should also remember that this variable seeks to determine the underlying process that accounts for the IC effect. Since it seems virtually impossible to prevent either process from occurring when the targets are individuals, even if instructions orient the participant in one direction, and especially in the context of the IC paradigm where information is presented in random order about two individuals (as opposed to the typical impression formation task where participants deal with one target at a time), it may be more fruitful to determine whether a structure/filter/schema as opposed to a memory/salience bias forms the basis of the IC effect. In other words, future research might focus on distinguishing between predictions from a connectionist framework including post-encoding processes and predictions from a straightforward memory-based/salience framework.

Another constraint to our research was that we expected to find an IC effect for both types of salience (i.e. RwS & ExS), thereby reproducing an earlier study. Finding the effect in only one type of salience, leads us to question why this distinction was not ever replicated after Hamilton and Gifford (1976). Since our results do not concur with their study, future research should aim to verify the extent of which the original findings are replicable. It may be that the use of individuals as targets is a special case and that when valences are reversed for other categories of objects the original results will be replicated.

Procedurally, our frequency estimation task for the RwS condition asked participants to estimate the quantity of negative behaviours (MinB) performed by each actor. Participants in the ExS condition were asked about the quantity of positive behaviours (MinB) performed by each actor. Owing to the pre-conceived notions about negative and positive behaviour, we cannot help but wonder if our question in the ExS condition may have solicited different cognitive pathways due to the wording of our question thereby influencing judgment. Future research may reframe the questions to "Estimate the quantity of the less frequently observed type of behaviour performed for each actor" so as to eliminate the words "positive" and "negative", which may be associated with "good" vs. "bad", although this wording might seem awkward to a naive participant. Future research may also include a control where half the participants could be asked to estimate the quantity of majority behaviour. Such a control may also limit the effect of a participant trying to fulfil what he thinks the experimenter wants.

In future research one could tease out the possible interference from dealing with two individuals simultaneously and better assess the possible role of absolute frequencies. This could be accomplished by presenting one target person at a time and using different absolute frequencies for different targets, while maintaining the same proportion in all cases (2:1). Such an experiment could be done by using a between groups design where one group could receive 4 vs. 8 stimuli in two behaviour categories while another group would receive 8 vs.16 and yet another group could receive 16 vs. 32 stimuli. Valence of minority and majority behaviour should be counterbalanced. A repeated measures design might permit each participant to do the attribution and frequency estimation tasks for the two individual targets in succession, which would help minimize interference for remembering or forming impressions of the two actors at once.

In conclusion, our study focused on distinctiveness-based ICs and it was based on a study by Hamilton and Gifford (1976). We managed to reproduce the effect for verbal material involving individuals instead of groups. We also innovatively managed to produce the effect with visual stimuli of individuals. Furthermore, we also innovated by using a time factor in our study. Not only did we find that time had a significant effect on the phenomenon; we discovered that an IC effect that was not present at T1, was present at T2. These findings lead us to posit that false memories could develop as a function of the IC paradigm.

We often hear that eyewitness testimony is rather weak at best. Our study would corroborate that statement. Finding an IC effect in the visual condition at T2 when none existed at T1 signifies that memory is not static and that it is prone to more errors as time goes by. Our study also suggests that both visual and verbal stimuli are subject to the IC bias, which seems to be more influenced by memory errors than by a better performance in remembering salient information.

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APPENDIX A

CONSENT FORM TO PARTICIPATE IN RESEARCH

Consent form to participate in research

I ____________________________ agree to participate in the experiment being conducted by André Roy, Ph.D. student in the Department of Psychology at Université du Québec à Montréal, under the supervision of Dr. Paul Cowen, Ph.D.

I understand that the purpose of this research is to measure how information about people is processed. I also understand that this research is being conducted to partially fulfill the requirements in obtaining a Ph.D. degree in psychology.

I have been informed that the experiment will take place in two sessions, the first taking place today and the second next week. During today's session I will be presented with a series of photographs (or sentences). After each photograph (or sentence), I will be asked to answer one question. After the entire series of the photographs (sentences) have been presented, I will be asked additional questions about the information that was presented. The entire procedure today should take less than 40 minutes. Next week, at the second session, I will again respond to a series of questions about the information presented today. The second session should take less than 15 minutes all together. I understand that I am free to discontinue my participation at any time. I also understand that no deception is involved in any part of this experiment and that my anonymity will be respected. Participant's identity will only be available to the experimenter so as to permit the compilation of responses from the 2 sessions. Subsequently, this identification will be destroyed.

My responses will be coded and none of the personal information I provide will be directly associated with the responses I give during the experiment. I understand that my participation in the experiment, as well as the information and data I provide, will be kept strictly confidential. If the results of this study are published, only group results and not individual results will be reported.

Name: (please print) ____________________________________

Date ____________________________________

Age ____________________________________

Sex (F/M) ____________________________________

Signature ____________________________________

APPENDIX B

INSTRUCTIONS FOR MEMORY CONDITION / CONSOLIDATION

Instructions for memory condition / consolidation

You will be shown a series photographs (sentences). Each photo (sentence) depicts one of two people performing different behaviours. Your task is to remember what each individual is doing. Each photo (sentence) will be presented for 8 seconds. You should attend to the photo (sentence) for the whole time it appears on the screen. After every photograph (sentence), the screen will go blank for eight seconds giving you enough time to write down a few key words that will help you remember what was presented on the screen. Use the list below to write down the key words for every photo (sentence) in their order of appearance. Writing down key words will help you remember the information so that you can answer questions later on. This task has been designed such that enough time is given in order for you to look at the image for the whole time it is being presented. You will hear a signal will when a new photograph (sentence) appears. If for any reason you have not finished writing your answer, please go back to look at the screen.

(36 lines)

APPENDIX C

IMPRESSION FORMATION INSTRUCTIONS / CONSOLIDATION

Impression formation instructions / consolidation

You will be shown a series of numbered photographs (sentences). Each photo (sentence) depicts one of two people performing different behaviours. Your task is to form a coherent impression of each individual. Each photo (sentence) will be presented for 8 seconds. You should attend to the photo (sentence) for the whole time it appears on the screen. After every photograph (sentence), the screen will go blank for eight seconds giving you enough time to write down whether the person you just saw (read about) was behaving in a positive or negative way. Use the list below to write down the word "positive" or "negative" for every photo (sentence) in their order of appearance. Writing down positive or negative will help you form an impression so that you can answer questions presented later on. This task has been designed such that enough time is given in order for you to look at the image for the whole time it is being presented. You will hear a signal will when a new photograph (sentence) appears. If for any reason you have not finished writing your answer, please go back to look at the screen.

Please do not look ahead in the booklet

This behaviour contributes to a positive (pos.) or negative (neg.) impression of the person.

APPENDIX D

FREE RECALL T1

Free recall T1

You have just been presented with a series of photographs (sentences) where Alex and Chris were performing different behaviours. Below, are two columns representing each actor. Please write down in the appropriate column all the behaviours that you remember for each actor. If you remember the behaviour but not the actor, please write the behaviour down in the column that best represents you're intuition about who performed it. Please indicate your intuition by writing an "X" besides your answer. Write down as many behaviours or actions as you can. Once you have completed this task, please rate how confident you are about the accuracy of your answers. When you are done, put down you're pen or pencil and wait for further instructions. Please do not look ahead in the booklet.

ALEX	CHRIS
(36 Lines)	

APPENDIX E

RECOGNITION TASK

Recognition task

The list below provides you with a series of descriptions of behaviour performed by Alex or Chris. Some of them represent the sentences you have read. Your task is to decide whether or not these descriptions correspond to the sentences that were originally presented. Indicate this by putting a check mark (√) in the appropriate column at the right of the description. Please give an answer for every item. Once you have completed this task, please rate how confident you are about the accuracy of your answers.

Please do NOT go back to add or change answers in the previous section. Please do not look ahead in the booklet.

	WAS presented	**NOT** presented
Alex is cleaning snow off a car		
Chris is throwing food on the floor		
Alex is yelling at someone on the telephone		
Chris is shooting out the window with his gun		
Chris is washing dishes in the sink		
Alex is doing the laundry		
Chris is cleaning the bathtub		
Chris is scratching the car with the key		
Alex is writing "up yours" on the mirror		
Chris is carrying shopping bags into the house		
Alex is getting drunk on beer		
Alex is mopping the floor		
Chris is covering his ears while sticking out his tongue		
Alex is fixing a broken toy		
Alex is smashing a chair into the wall		
Chris is studying his text book		
Alex is giving his old clothes to charity		
Chris is hanging clothes on a line to dry		
Alex is picking up litter from the sidewalk		
Chris is pouring ketchup into a cup of coffee		
Chris is tearing a book apart		
Alex is picking his nose		
Chris is setting the dinner table		
Alex is spitting at someone		
Chris is shovelling snow from a driveway		
Alex is writing a love note		
Alex is swinging a crow bar at a car window		
Chris is forging someone's signature on a cheque		
Chris is throwing a plate on the floor		
Alex is cleaning a window		
Chris is vacuuming the inside of his van		
Alex is spray painting graffiti on a wall		

APPENDIX F

ATTRIBUTION TASK

Attribution task

You will now read descriptions of each of the behaviours presented in the photographs (sentences) that you saw (read). Your task is to determine which actor performed the behaviour. Please put a check mark (√) in the appropriate column. If you do not remember the actor, put a check mark in the column that best represents your intuition. Please indicate your intuition by writing an "X" besides your answer. Give an answer for every description below. Once you have completed this task, please rate how confident you are about the accuracy of your answers. Please do NOT go back to add or change answers in the previous section(s). Again, please do not look ahead in the booklet.

Behaviour or action	ALEX	CHRIS
Putting trash in the garbage bag		
Getting drunk on beer		
Making his bed		
Enjoying reading a book		
Cleaning the blinds		
Throwing a plate to the floor		
Cleaning a spill on the floor		
Filling the recycling bin with paper		
Writing "up yours" on the mirror		
Covering his ears while sticking out his tongue		
Mopping the floor		
Setting the dinner table		
Giving someone the finger		
Writing a love note		
Shining his shoes		
Holding a knife prepared to attack		
Studying his text book		
Cooking food in a big pot		
Giving his old clothes to charity		
Picking his nose		
Serving someone spaghetti and sauce		
Shooting out the door with his sling shot		
Cleaning off the kitchen table		
Washing dishes in the sink		
Peeling potatoes at the sink		
Pouring ketchup into a cup of coffee		
Putting a band-aid on someone's finger		
Playing Monopoly		
Vacuuming the inside of his van		
Dusting the TV		
Breaking a compact disc		
Opening a car door for someone		
Swinging a crowbar at a car window		
Preparing to shoot out the window with his gun		
Cleaning snow off of a car		
Changing a light bulb on the ceiling fixture		

APPENDIX G

FREQUENCY ESTIMATION TASK

Frequency estimation task

In this last part of the experiment, your task is to estimate how many negative behaviours each actor performed. We are providing you with the total number of photographs (sentences) that were presented for each actor. Once you have completed this task, please rate how confident you are about the accuracy of your answers.

Please do NOT go back to add or change answers in the previous section(s).

	How many of these were negative behaviours? *
ALEX was presented in 24 pictures (24 behaviours)	
CHRIS was presented in 12 pictures (12 behaviours)	

* Note: this questionnaire was for RwS . Those in the ExS condition were asked: “How many of these were positive behaviours?”

Once you have finished this section, part one of this experiment will be complete. Please close your answer booklet and give it to the person in front of you so that it may reach the first row in front of the class.

THANK YOU FOR YOUR COOPERATION and GENEROSITY.

THANK YOU FOR CONTRIBUTING TO SCIENCE.

See you next week for the second (and much shorter) part of the experiment after which I will be able to answer any questions you may have about the experiment.

Sincerely, André Roy.

APPENDIX H

WRITTEN DIALOGUE FOR EXPERIMENT SOLICITATION

Written dialogue solicitation for experiment

Hi, my name is André Roy; I am a doctoral student in psychology at l'UQÀM. I wish to thank you all for allowing me to speak with you for a few minutes. As you may or may not know, completing a doctoral degree in psychology is filled with different tasks, one of which is conducting a study for research purposes. This is the reason for my presence here today.

You're professor __________________ has graciously accepted to contribute some of her class time, to allow me to conduct a study. She knows that science advances only if people give a little of their time to share in the efforts of others. Today, I am here to ask if you would kindly allow me some of your precious time so that I can conduct a study.

The study would take place during class time, and would replace part of the lecture for that day. In essence, all you have to do is show up for class like usual, but instead of getting a lecture you would learn firsthand how a study is conducted. In addition, you would be contributing to the advancement of knowledge in the field of psychology and more specifically, social perception.

The study would be in two parts. In part one, I would come next week and show you a series of photographs or sentences presented on a screen/monitor. During and after the presentation I will ask you to fill out a number of different questionnaires. This would take a little less than 40 minutes.

The second part of the study would take place the following week and would last less than 15 minutes. At that time, I will hand out another questionnaire that you will fill out. That will complete the study.

It would be important for you to attend at both times since the information collected the second time will be tabulated with the information collected the first time. Furthermore, I will be able to answer any questions you may have about the study only once it is over. Those of you completing both parts of the experiment will be eligible to win a $50.00 cash prize.

Thank you for your time.

APPENDIX I

WRITTEN DIALOGUE PRESENTING EXPERIMENT TO PARTICIPANTS

Written dialogue presenting the experiment to participants

Hi, my name is André Roy. I am a doctoral student in psychology at l'UQÀM and I wish to thank you all for being here to participate in this research. I am certain that some of you will continue your education and one day, be in my position. You will then be grateful, like I am right now, to have people as generous as you are, giving a little of their time in order to contribute to the advancement of science. Unfortunately, contributing to science in this way is not a lucrative business for you or for me but those of you who complete the experiment will be eligible to win a $50.00 prize.

This experiment consists of measuring how information about people is processed. I will be presenting you with a series of photographs (sentences) and asking you to fill out different questionnaires based on what you have seen (read). Some questionnaires are longer than others are with the last one taking just a few seconds. The total time of your participation today will be about 40 minutes. I will not be able to answer questions today, since there is a second, much shorter (15 min), part next week. At that time I will answer, any of your questions.

Please understand that any information you give will be kept in strictest confidence.

I will now distribute stapled sheets of paper that you will place in front of you. It is imperative that you do not; I repeat, do not open the booklet. I previously mentioned the different questionnaires and would now like to add that they must be filled out in a specific order. The reason you may not look at them before I ask you to is that it will compromise the entire study and make the results useless, thereby wasting your time and mine. So please, just place the booklet in front of you and read the cover page while everybody gets a booklet.

(Once everybody has their booklets, I read the cover page with them (consent form) and invite them to complete and sign it.)

Now that you have all filled out the first page of the booklet, the experiment can begin. There will be different parts to this experiment and before each of them; I will read out the instructions that you need to know for the part.

Part one: Showing the photograph (sentence) set.

I will now show you a series of photographs (sentences) about two people named Alex and Chris. Each photograph (sentence) will be presented for eight seconds followed by an eight-second blank screen. Your task is to look carefully at what is presented on the screen, for the whole time it being presented. After each presentation, answer the question in the booklet that has been provided.

Please turn to page 2 of your booklets The experiment will now begin

APPENDIX J

INTRODUCTION AND INSTRUCTIONS TO EXPERIMENT (PART 2)

Introduction and instructions to experiment (part two)

Hi again, my name is André Roy. I would like to thank you very much for being here today. As you know, I am here to present you with part two of the experiment we started last week. This part is much shorter than last week but still very important to the study. In fact, although it should take less than 15 minutes to complete this task, I ask that you be attentive and serious about it.

I will hand out a booklet; similar to the one I gave you last week. In it, you will find almost the same questionnaires as in the other. I will ask you to complete the questionnaires one by one with as much diligence as possible.

We will now begin.